PB89-117378

Superfund Record of Decision (EPA Region 1)
Keefe Environmental Site, Epping, New Hampshire
March 1988 (Second Remedial Action)

(U.S.) Environmental Protection Agency
Washington, DC

21 Mar 88

U.S. Department of Commerce
National Technical Information Service
NTIS

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Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R01-88/024
March 1988

EPA

Superfund Record of Decision:

Keefe Environmental, NH

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Keefe Environmental Services (KES) site is located in a semi-rural area in Epping, New Hampshire. Surface water from sections of this site flows toward a wetland area to the immediate south. Considerable filling and excavation have occurred at the site using the materials for site fill, road construction, surface leveling, and dike construction purposes. In May 1978, Mr. Paul Keefe constructed a chemical waste storage facility by establishing drum storage areas, large storage tanks, equipment shelters and a bulking area. A 700,000 gallon capacity, synthetically lined, waste lagoon was also installed. During April 1979, the New Hampshire Bureau of Solid Waste Management (NHBSWM) and the Division of Public Health Services (DPHS) ordered KES to clean up a number of leaking storage tanks, ruptured drums, improperly dumped latex waste, and contaminated soils. At this time, a series of complaints were made by local residents, concerning strong odors attributed to the site. These complaints resulted in legal action against KES. During September 1979, a surface water and ground water sampling program identified seven chlorinated hydrocarbons in the ground water wells. This resulted in the issuance of a second clean up order focusing on the removal of all leaking drums, spills, and contaminated soil, daily inspection of drums for leaks, and reduction in total number of drums stored onsite. Beginning in November 1979, drinking
(See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision
Keefe Environmental Services, NH
Second Remedial Action
Contaminated Media: gw, soil, sw
Key Contaminants: VOCs

b. Identifiers/Open-Ended Terms

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OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

A

16. ABSTRACT (continued)

water wells of the twelve surrounding residences were sampled by the New Hampshire Water Supply and Pollution Control Commission (NHWSPCC) for chemical compounds and biological parameters. The sampling indicated the presence of several VOCs in some wells. Removal actions initiated between June 1981 and November 1982, and then again in March 1983, removed 2,029 fifty five-gallon drums, 84 thirty gallon drums, 47 cauldrons and trays, 51 carboys, 1,630 five gallon pails, 124 empty drums, and 10 fiber and 155 miscellaneous containers. In addition, approximately 4,100 five-gallon drums, 4 five thousand-gallon, and 4 ten thousand-gallon above-ground tanks were removed from the site. A first operable unit ROD, signed in November 1983, approved the removal of contents from the lagoon, lagoon liner, and adjacent contaminated soil. This second operable unit addresses soil and ground water contaminated with VOCs.

The selected remedial action for this site includes: in-situ treatment of soil using vacuum extraction with discharge to the atmosphere; and ground water pump and treatment using air stripping, filtration, and carbon adsorption with discharge to a ground water recharge area adjacent to the wetland along the site border. The estimated present worth cost for this remedial action is $6,100,000 with present worth O&M of $4,157,700.

RECORD OF DECISION

Remedial Alternative Selection

SITE NAME AND LOCATION

Keefe Environmental Services Waste Site
Epping, New Hampshire

STATEMENT OF PURPOSE

This Decision Document represents the selected remedial action for the Keefe Environmental Services Site developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Contingency Plan (NCP), 40 CFR Part 300 et seq., 47 Federal Register 31180 (July 16, 1982), as amended. The Region I Administrator has been delegated the authority to approve this Record of Decision.

The State of New Hampshire has concurred on the selected remedy and determined, through a detailed evaluation, that the selected remedy is consistent with New Hampshire laws and regulations.

STATEMENT OF BASIS

This decision is based on the administrative record which was developed in accordance with Section 113(k) of CERCLA and which is available for public review at the Epping Public Library and the EPA Library. The attached index identifies the items which comprise the administrative record upon which the selection of the remedial action is based.

DESCRIPTION OF THE SELECTED REMEDY

The selected alternative for the Keefe Environmental Services (KES) Site includes both a source control and management of migration component.

Source Control Alternative

Source Control Alternative SC-3A - Vacuum Extraction is selected for treatment of contaminated soils. This alternative will involve installation of between 13 to 20 vacuum extraction wells in the unsaturated soils on-site. The number of extraction wells is dependent upon the radius of influence each well exerts within the soil matrix and will be determined as part of the pilot plant studies during the design. Unsaturated soils are those which are above the ground water table.

Four areas at the KES Site will be subject to the vacuum extraction system. The depth to ground water in these areas varies from 7-10 feet in the central portion of the Site to 3-5 feet in the southwestern corner of the site. For the purposes of cost analysis, the area proposed for vacuum extraction has been conservatively estimated at 150,000 square feet. This area will be confirmed during the pilot plant study stage.

This alternative is expected to require relatively little time to implement. Several vacuum wells can be completed by a single crew in a day and collection piping and mechanical equipment can be installed concurrently. No soil excavation is required. Vapor extraction can be started upon completion of the system and immediate results realized.

Although the length of time for treatment is dependent upon extraction efficiency and actual soil area to be treated both of which need to be further defined during the pilot plant study stage, five years for treatment has been estimated.

Management of Migration Alternative

MOM-GW3B is selected for the treatment of contaminated ground water. This alternative involves pumping contaminated ground water and treating on-site using air stripping, filtration and carbon adsorption and discharging the treated ground water back to the ground. Air stripping will be preceded by coagulation/precipitation for metals removal. Although no metals are above water quality criteria, metals removal is necessary to remove iron from the ground water to prevent the iron from oxidizing and precipitating out in the air stripper and causing operational problems.

Ground water extraction will be performed using the existing deep bedrock well CW-3C located in the center of the Site. In addition, two collection trenches, 1300 feet and 1000 feet long by 2 feet wide, will be used to extract water from the sand and gravel deposits overlying the bedrock. Estimated pumping rate for well CW-3C is 2-5 gallons per minute and for the trenches is 2 gallons per minute for a combined rate of 4-7 gallons per minute.

The air stream exiting the air stripper will contain volatile organic compounds which will be treated using a vapor phase carbon unit prior to discharge to the atmosphere. Treated ground water from the air stripper is further treated using granulated activated carbon to insure the discharge complies with EPA Drinking Water Quality Standards. EPA estimates that it will take approximately five years to reach the ground water cleanup goals.

The total present worth cost of the selected alternative is estimated to be approximately 6.1 million dollars. The estimate includes the present worth capital cost of vacuum extraction of waste from soils ($1,138,300); the present worth cost of operation and maintenance for vacuum extraction ($3,193,900); the present worth capital cost of ground water treatment ($799,000); and the present worth cost of operation and maintenance for ground water treatment ($963,800).

The present worth cost of operation and maintenance for vacuum extraction is based upon a projected cost of $842,500 per year for five years of operation. The present worth cost of operation and maintenance for ground water treatment is based upon a projected

D

cost of $254,240 per year for five years of operation.

DECLARATION

The selected remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate and is cost-effective. This remedy satisfies the statutory preference for treatment that permanently and significantly reduces the volume, toxicity and mobility of the hazardous substances, pollutants and contaminants, as a principle element. Finally, it is determined that this remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

March 21, 1988
Date

Paul G Keough, Acting
Regional Administrator

ROD SUMMARY

KEEFE ENVIRONMENTAL SERVICES

EPPING, NEW HAMPSHIRE

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ROD SUMMARY
Keefe Environmental Services Superfund Site
Epping, New Hampshire

I. SITE NAME, LOCATION AND DESCRIPTION

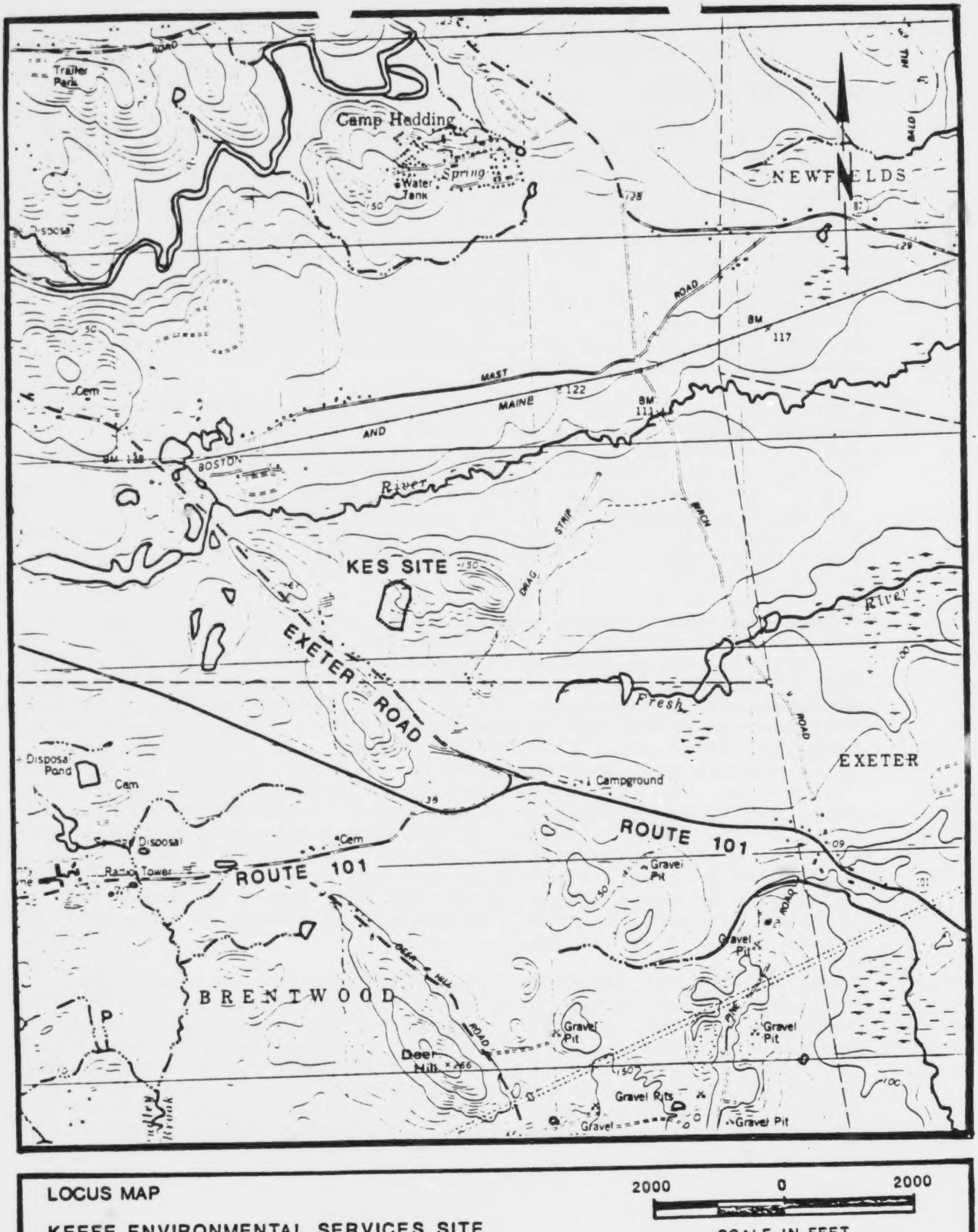
The Keefe Environmental Services (KES) Site is located in a semi-rural area just off Exeter Road (Old Rte. 101) approximately two miles southeast of the municipal center of Epping, New Hampshire (Figure I-1). A dozen residences lie along Exeter Road near the site providing housing for more than 30 people. There is a chicken farm to the west of the site and a dragstrip to the east. The site occupies six to seven acres of land north of Exeter Road and south of the Piscassic River.

Topographic relief at the KES Site is low to moderate. The highest elevations (El. 160± MSL) occur at the northeast corner of the Site and the lowest elevations in a wetland (El. 126± MSL) to the southwest, toward Exeter Road. Abrupt changes in elevation (greater than ten feet) are due primarily to excavation and filling activities.

Two surface streams originate adjacent to the Site. Surface water accumulating in a wetland area at the northwest corner of the Site drains northwesterly toward the Piscassic River via a brook which flows beneath the gravel pit access road. Surface water from all other sections of the Site flows southward toward a wetland area immediately south of the Site. Surface water subsequently flows eastward from this wetland area toward the Fresh River.

The remains of a manmade lagoon are located in the northeast quadrant of the Site. The lagoon was emptied and breached in early 1984 by a contractor engaged by the New Hampshire Department of Environmental Services (DES) formerly known as the New Hampshire Water Supply and Pollution Control Commission (NHWSPCC). The center of the Site is occupied by three buildings.

Considerable filling and excavation has occurred at the KES Site. Till materials have been mined from an embankment in the northeast corner of the Site. The excavated material has been used for (1) filling portions of the Site located at lower elevations where standing water tended to accumulate, 2) road construction at the Site, (3) leveling surfaces in areas formerly used for drum storage and (4) the construction of the dike for the waste lagoon.


Trailer Park
ROAD
Camp Hedding
Spring
Water Tank
150
Disposal
NEWFIELDS
128
129
ROAD
BM 117
MAST
MAINE
122
AND
BM 111
BM 138
BOSTON
River
Cem
50
KES SITE
150
DRAG STRIP
BEACH
EXETER ROAD
River
Fresh
ROAD
EXETER
Disposal Pond
Cem
Campground
ROUTE 101
Sewage Disposal
Cem
Radio Tower
ROUTE 101
Gravel Pit
Gravel Pit
DEER HILL ROAD
BRENTWOOD
P
Gravel Pit
Gravel Pit
Deer Hill 266
150
Gravel Pits
Gravel
Gravel Pit
100

LOCUS MAP

KEEFE ENVIRONMENTAL SERVICES SITE

EPPING, N.H.

FIGURE I - 1

2000 0 2000

SCALE IN FEET

CAMP DRESSER & MCKEE INC.

II. SITE HISTORY

On March 28, 1978 Mr. Paul Keefe proposed to construct a chemical waste storage facility in Epping, New Hampshire. Under his plan, AMEX, Inc. would own the Site and Keefe Environmental Services (KES), Inc. would own all buildings and equipment and would operate the facility. Both corporations were controlled by Mr. Keefe. Subsequent to the Planning Board's approval of the KES Site plan on May 31, 1978, KES began operation by establishing drum storage areas, large storage tanks, equipment shelters and a bulking area. A 700,000 gallon capacity, synthetically lined waste lagoon was also installed. Periodic Site inspections were made by both State and local officials and recommendations were made to improve site operations.

During April 1979, the New Hampshire Bureau of Solid Waste Management (NHBSWM) and the Division of Public Health Services (DPHS) ordered KES to cleanup a number of leaking storage tanks, ruptured drums, improperly dumped latex waste and contaminated soils. At this time, a series of complaints were made by local residents concerning the strong odors attributed to the KES Site. As a result of the odor complaints, the Town of Epping instituted legal action against KES in the Rockingham County Superior Court in May 1979.

During September 1979, a surface water and ground water sampling program was established. On October 16, 1979, carbon tetrachloride and chloroform were detected in the stream to the northwest of the Site. A second cleanup order issued by the State in November 1979 declared that it had identified seven chlorinated hydrocarbons in the KES ground water wells. These chemicals were methylene chloride, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethylene, tetrachloroethylene, carbon tetrachloride, and chloroform. The order addressed the hazardous conditions at the KES facility as an imminent hazard under the authority of Chapter 147:54. The order required the removal of all leaking drums, the cleanup of spills and contaminated soil, the daily inspection of drums for leaks and reduction in the total number of drums stored on site. The order also mandated the development of a fire contingency plan and the stabilization of the amount of hazardous wastes accepted at the facility.

Also, starting in November 1979, drinking water wells of surrounding residences were sampled by the New Hampshire Water Supply and Pollution Control Commission (NHWSPCC) for chemical compounds and biological parameters. This sampling indicated that some residential wells contained elevated concentrations of carbon tetrachloride and chloroform in addition to other compounds. Potable water sampling was performed for approximately six months due to suspected surface and ground water contamination from the KES Site. The potable water sampling program was discontinued when all chlorinated organic compounds had diminished to non-detectable levels. Also, in November 1979, KES installed four new monitoring and observation wells in addition to the five observation wells which previously had been installed.

In response to the State's November order, KES filed a motion for a rehearing on December 5, 1979, denying that the conditions at the bulking and treatment facility in Epping constituted an immediate threat to public health and the environment. Also in December, a Master's Report, issued by the court in the Town's litigation, called for cleanup measures similar to those described in the State's November 1979 order and further required analytical testing of each drum, employee safety equipment and permission for unannounced on-site inspections by the Town. Further, in December 1979, after KES filled a wetland area to allow access to the four newly installed observation wells, the NHWSPCC issued a wetlands violation notice to Mr. Keefe ordering KES to refrain from all construction activities until the requisite permits were granted.

On April 23, 1980, a court order specified the basis by which KES could continue to operate in a safe manner while abating the problems present on site. The court found that the Site, as it operated at the time, no longer presented a grave and immediate threat to human public health and the environment beyond its boundaries. The court stated that the majority of life-threatening conditions which previously existed had been brought within acceptable levels of control.

On June 5, 1980, the Attorney General's Office notified KES of the State's recommended sampling and analysis procedures for the new and existing monitoring wells and for the surface waters on and around the KES Site. The required analytical parameters included color, chemical oxygen demand (COD), nitrogen, iron, manganese, chromium, copper, arsenic, potassium, sodium, zinc, chloride, pH, specific conductivity, sulfate, total dissolved solids and total organic carbon. A monthly gas chromatographic scan was recommended to identify and quantify any volatile and non-volatile organics detected in the sample. Surface waters adjacent to the KES Site were to be sampled and analyzed on a quarterly basis.

On January 21, 1981, due to financial constraints, Keefe Environmental Services, Inc. filed for reorganization in Federal Bankruptcy court. Following a court investigation which showed that a reorganization plan could not be formulated to successfully operate KES, Mr. Keefe filed for voluntary bankruptcy and the Site was abandoned.

The lagoon was sampled by EPA on February 17, 1981. EPA declared an emergency at the KES Site on February 27 because the lagoon was close to overflowing. EPA's Field Investigation Team (FIT) contractor began site investigations, including emergency lagoon berm stabilization work under Section 311(k) of the Clean Water Act. On March 3, 1981, the EPA's Emergency Response Team (ERT) from Edison, New Jersey, used a mobile carbon filter unit to draw the lagoon down 3 1/2 feet. The lagoon was eventually drawn down four more times.

During the Spring of 1981, rising temperatures caused expansion of the contents of a number of drums, resulting in drum failures and leaking of contents onto the ground. The increased temperature also accelerated the deterioration of drums containing acid. EPA engaged Marlyn Engineering for a drum stabilization program consisting of overpacking, poly-capping, snap-capping or transferring ruptured drums. A subcontract with Rockingham Security for a 24-hour security guard at the Site was included. These contracts were funded under the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA).

Between June 11, 1981 and November 19, 1982 the State and several generators engaged in a joint, cooperative cleanup effort. As a result of this effort the following materials were removed: 2029 fifty-five gallon drums, 84 thirty gallon drums, 47 cauldrons and trays, 51 carboys, 1630 five gallon pails, 124 empty drums, 10 fiber and 155 miscellaneous containers.

EPA engaged a contractor in July 1982 to remove imminent health hazards (such as shock-sensitives, explosives, water reactives, toxic gases and spontaneous combustibles) from warehouses at the KES Site. In addition, storage tank contents were to be removed as well as all on-site dumpsters. A Remedial Action Master Plan (RAMP) was prepared and submitted in the Fall of 1982 which outlined possible future long term remedial actions. In March 1983 the State of New Hampshire, through a Cooperative Agreement with the EPA, removed approximately 4,100, 55-gallon drums, four 5,000-gallon and four 10,000 gallon above ground tanks and seven dumpsters from the Site. In November 1983, the State contracted to have the 700,000-gallon lagoon drained and the liner disposed of.

Tighe and Bond Consulting Engineers were engaged by the NHWSPCC to perform a Remedial Investigation (RI) in July 1983 and the RI report was accepted by the NHWSPCC in October 1984. Camp Dresser & McKee, Inc. (CDM) was engaged by the NHWSPCC in August 1985 to perform a Supplemental Remedial Investigation and Feasibility Study (FS). The results of the RI, Supplemental RI and FS are summarized below. For details please refer to these documents.

As a result of the field investigations conducted by both Tighe & Bond Consulting Engineers and Camp Dresser & McKee, Inc., four zones of potential soil contamination were delineated. These zones were characterized by high organic vapor concentrations in soil gas samples detected with field monitoring equipment. Three of the potentially contaminated zones are located at the Site perimeter in low lying areas which receive surface runoff from the Site. The fourth zone is located on a flat graded area. Sporadic areas of discolored soil and vegetative stress are located within this zone.

Analytical data indicates that the ground water on-site is contaminated with volatile organic compounds which, for the most part, are present in both the shallow bedrock and overburden aquifers. The distribution of contaminants at the Site suggests the existence of two possible source areas of contamination. One area is located in the central portion of the Site in the vicinity of the chemical bulking and storage area. The second area is located in a wetland at the southwest corner of the Site. In bedrock well CW-3C and overburden well CW-3A which, as shown on Figure II-1, are both located in the central portion of the Site near the old chemical bulking and storage areas, the concentrations of volatile organics are approximately 1 ppm and 12 ppm, respectively. In overburden wells CW-5B and CW-5A, both located down gradient from CW-3C and CW-3A in the southwest corner of the Site, total volatile organic concentrations approach 5 ppm and 9 ppm, respectively.

Shallow bedrock contamination in the location of monitoring well CW-3C may be attributable to leakage between well CW-3A and CW-3C and not vertical migration through natural materials. Bedrock contamination in the vicinity of monitoring well CW-5C may have resulted from cross contamination with the surficial monitoring well and/or vertical migration of contaminants through natural materials. Available information indicates there is no widespread contamination of the bedrock aquifer.

The elevated concentrations of ground water contamination present in overburden well CW-3A suggest that the source of contamination in this area may originate in the central portion of the Site in the vicinity of the chemical bulking and storage areas. Contamination in overburden wells CW-5A and CW-5B is thought to originate from contaminated surface runoff from the Site which pooled in this area and infiltrated into the ground water.

Residential well data, obtained throughout the remedial investigation indicate that nearby residences are not being affected by contaminants from the KES Site. Data suggests that the residential wells south of the Site are supplied from the bedrock and overburden aquifers which flow from the south toward the Site.

Volatile organic contaminants have been detected in streams originating in the vicinity of the KES Site. However, the concentrations of volatile organics decrease to below detectable quantities within 500 feet of the Site. Based upon these observations, it is suggested that surface flow does not provide a pathway for contaminant migration from the Site.

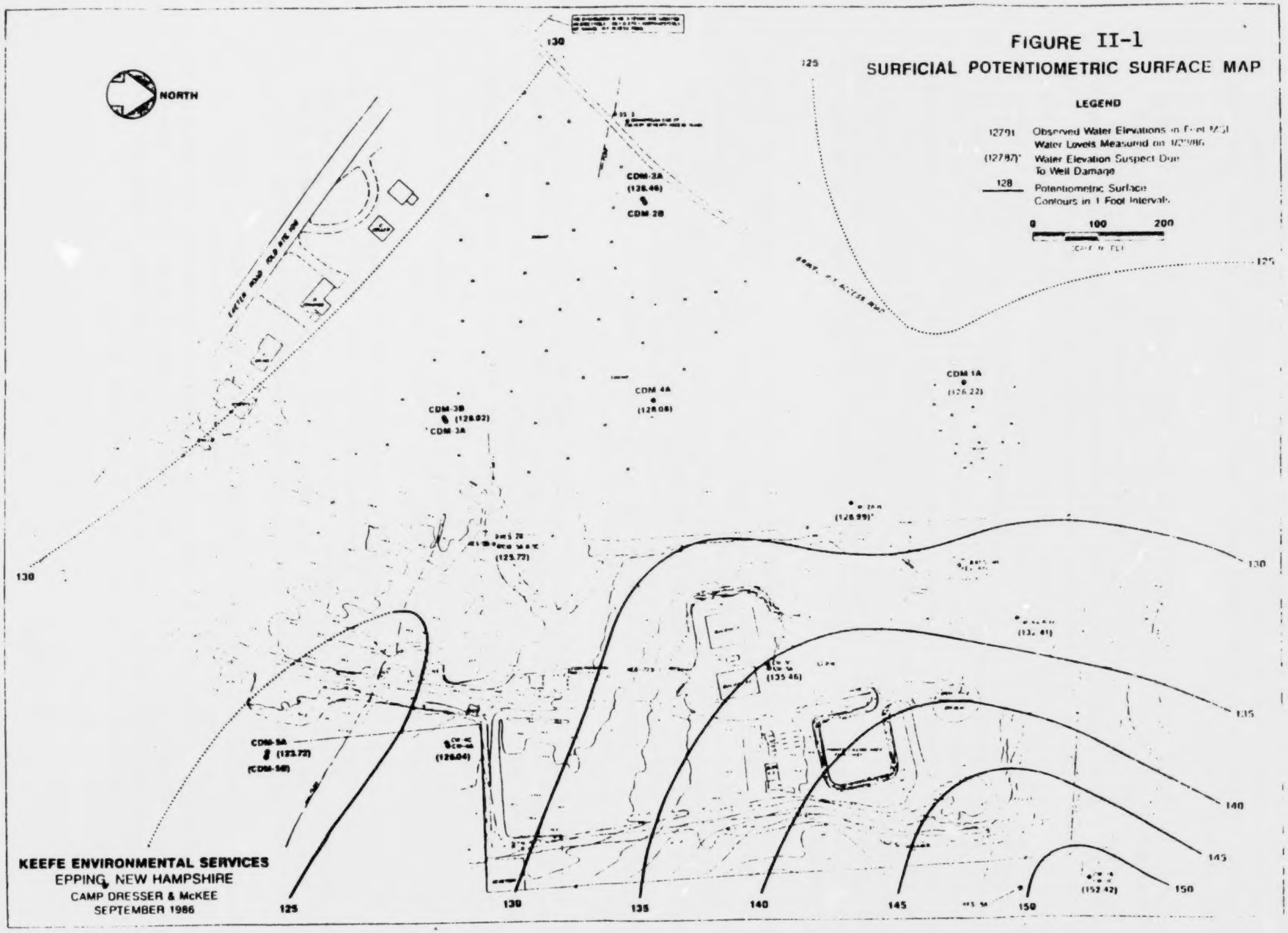

NORTH
130
125
135
140
145
150
CDM-3A
(128.46)
CDM 2B
CDM 4A
(128.08)
CDM 1A
(126.22)
CDM-3B
(128.02)
CDM 3A
(125.72)
(128.99)*
(135.46)
(132.41)
(126.04)
CDM-5A
(123.72)
(CDM-5B)
(152.42)

FIGURE II-1
SURFICIAL POTENTIOMETRIC SURFACE MAP

LEGEND

127.91	Observed Water Elevations in Feet MSL Water Levels Measured on 1/29/86
(127.87)*	Water Elevation Suspect Due To Well Damage
128	Potentiometric Surface Contours in 1 Foot Intervals

0 100 200
SCALE IN FEET

KEEFE ENVIRONMENTAL SERVICES
EPPING, NEW HAMPSHIRE
CAMP DRESSER & McKEE
SEPTEMBER 1986

Contamination at the KES Site is alleged to have originated from leaking storage tanks, ruptured or leaking drums and from leaking in ground bulking vats. These source materials were eliminated during the initial removal activities, however, there is contamination present in the soil, ground water and surface water.

The health risks associated with present conditions at the KES Site were evaluated for ingestion of contaminated well water, dermal contact and subsequent ingestion of contaminated surface soils and dermal contact with surface waters. At the present time there are no detected contaminants in residential water from wells adjacent to the Site, so risks associated with drinking this water cannot be calculated. However, assuming that contaminated ground water was to migrate off Site and impact residential wells at contaminant levels equal to what presently exists, the incremental risk associated with drinking the water would be 1.1×10^{-3}. This risk level exceeds the recommended risk range of 10^{-4} to 10^{-7} for Superfund sites. Assuming unrestricted use of the Site in the future, the risk associated with drinking the ground water below the Site would be 1.1×10^{-3} to as high as 6.6×10^{-2}. The risks associated with dermal contact, and subsequent ingestion of contaminated soils and contact with contaminated surface waters were determined to be within a range of 10^{-8} to 10^{-10} for both present and future site use. The Site was listed on the NPL on October, 1981.

III. ENFORCEMENT HISTORY AND STATUS

From 1982 to 1986, EPA undertook extensive efforts to negotiate with all identified potentially responsible parties (PRPs) to achieve a settlement with respect to liability for past and future costs of response actions at the Site. On March 19, 1986, a consent decree among EPA, the State of New Hampshire, the Town of Epping and 127 settling PRPs was entered. On March 20, 1987, a memorandum of agreement among EPA, the State of New Hampshire, the Town of Epping, the United States Navy and the United States Air Force was finalized.

In general, the terms of the Consent Decree and Memorandum of Understanding provide that the settling parties shall pay the United States government and the State of New Hampshire specified shares for past and future costs of response actions at the Site. All past and future costs, however, were not recovered from the settling parties.

Approximately 30 PRPs were not parties to the consent decree with EPA and the State. EPA presently intends to seek all past and future costs that were not recovered from the settling parties from these non-settling PRPs.

IV. COMMUNITY RELATIONS: INVOLVEMENT AND CONCERNS

Community relations activities conducted at the KES Site to date have included:

- NHDES held a public meeting on September 19, 1985 to discuss the results of the Remedial Investigation Report.
- NHDES issued a press release on December 26, 1987 notifying the public of the availability of the Draft Supplemental Remedial Investigation (RI), Draft Feasibility Study (FS) and Proposed Plan.
- EPA mailed letters to PRPs on December 31, 1987 notifying them of the availability of the Supplemental RI, Draft FS and Proposed Plan.
- NHDES held a public informational meeting on January 6, 1988 to discuss results of the Draft Supplemental RI, Draft FS and the Proposed Plan.
- EPA held a public meeting on January 21, 1988 to receive oral comments on the Draft Supplemental RI, Draft FS and Proposed Plan.
- EPA conducted a public comment period on the Draft Supplemental RI, Draft FS Proposed Plan from January 7, 1988 through February 17, 1988.

V. EVALUATION OF ALTERNATIVES

A. Introduction

On October 17, 1986, the President signed into law the Superfund Amendments and Reauthorization Act of 1986 (SARA) amending the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). Prior to October 17, 1986, actions taken in response to releases of hazardous substances were conducted in accordance with the revised National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300, dated November 20, 1985. Generally, the purpose of the NCP is to effectuate the response powers and responsibilities created by CERCLA. In accordance with Section 105 of CERCLA as amended by SARA, the current NCP is being revised to reflect the additional provisions of SARA. In the interim, prior to the revision of the NCP, the procedures and standards for responding to releases of hazardous substances, pollutants and contaminants shall be in accordance with Section 121 of CERCLA as amended and to the maximum extent practicable, the current NCP.

SARA retains the original CERCLA mandate for protective and cost-effective remedial actions. According to Section 300.68(a)(1) of the NCP, remedial actions are those responses to releases that are consistent with a permanent remedy to prevent or minimize the release of hazardous substances or pollutants or contaminants so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment. SARA adds a new statutory emphasis on risk reduction through destruction or treatment of hazardous waste rather than protection achieved through prevention of exposure. Section 121 of SARA also establishes a statutory preference for remedies that permanently and significantly reduce the volume, toxicity or mobility of hazardous wastes over remedies that do not achieve such results through treatment. Furthermore, CERCLA requires that EPA select a remedy that is protective of human health and the environment, that is cost-effective and that utilizes permanent solutions and alternative treatment technologies, to the maximum extent practicable.

In accordance with CERCLA and the NCP, the primary remedial response objectives for Superfund remedial actions are:

- prevent or mitigate further releases of contaminants to surrounding environmental media;
- eliminate or minimize the threat posed to public health or welfare or the environment;
- reduce the volume, toxicity or mobility of hazardous wastes through the use of treatment technologies; and
- utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

Section 300.68 of the NCP, in conjunction with the EPA guidance document entitled "Guidance on Feasibility Studies under CERCLA," also sets forth a remedial alternative development and remedy selection process consisting the following seven steps:

1. Identify the nature and extent of contamination and threat presented by the release [§300.68(f)].
2. Identify general response actions that may be needed to remedy the release [§300.68(e)]

3. Identify and screen remedial technologies potentially applicable to wastes and site conditions [§300.68(e)].

4. Develop alternatives to achieve site-specific objectives [§300.68(f)].

5. Initial screening of alternatives [§300.68(g)].

6. Detailed analysis of alternatives [§300.68(h)].

7. Selection of remedy [§300.68(i)].

Both CERCLA as amended and the NCP require first the identification of the nature and extent of contamination at the Site. Beyond the initial site characterization, CERCLA retains the basic framework for the remedial alternatives development and remedy selection process enacted through the NCP, but each phase is modified to reflect the provisions of CERCLA.

The nature and extent of contamination and the threat presented by the release at the Site was documented in the Remedial Investigation for the Site and presented as part of the discussion on Site History. A discussion of how CERCLA affects each particular phase of the remedy selection process follows.

B. Response Objectives

Consistent with the NCP, remedial response objectives for the KES Site were developed for source control measures, which address source areas of contamination and management of migration measures, which address areas that have been affected by the migration of contaminants away from the source areas.

1. Source Control Objectives

The remedial response objectives for source control measures are:

- prevent or mitigate the further release of contaminants to surrounding environmental media;
- eliminate or minimize the threat posed to public health, welfare and the environment from the source area; and
- reduce the volume, toxicity or mobility of hazardous substances, pollutants and contaminants.

The first objective entails addressing the migration pathways of contaminated soils at the KES Site. The primary migration pathway identified at the KES Site is the downward migration of contaminants from the soils into the ground water of the overburden and bedrock aquifers.

The second objective entails addressing the exposure pathways, receptor populations and levels of exposure associated with the soil source areas. Human health risks are the primary concern of this objective. Risks associated with dermal contact, inhalation and subsequent ingestion of soil are evaluated with the primary receptor population defined as young children living near or on the Site.

The third objective entails use of on-site treatment technologies which will result in a permanent solution with emphasis of innovative technologies where practicable.

According to the National Contingency Plan (NCP), all applicable or relevant and appropriate federal public health and environmental requirements must be identified and "...EPA believes that those requirements must be met in order to achieve an effective CERCLA remedy." (Federal Register Vol. 50, No 224, November 20, 1985), 40 CFR Part 300. When evaluating measures to isolate the source areas, the requirements of RCRA (Resource Conservation and Recovery Act), and TSCA (Toxic Substances Control Act), SDWA (Safe Drinking Water Act), and CAA (Clean Air Act) among others will be used to ensure protection of the public health, welfare and the environment. These laws address not only eliminating direct contact with source material but also potential releases, i.e., to ground water or surface water from source material. Currently there are no federal requirements which contain standards or target levels which apply to soils. Therefore, when considering treatment or removal of waste and soil source areas, a combination of risk analysis and an engineering-based cost effectiveness will be used to develop target levels which will be protective of the public health, welfare and the environment.

2. Management of Migration Objectives

The remedial response objectives for management of migration measures are:

- preventing or mitigating migration of contaminants beyond their current extent; and

- eliminating or minimizing the threat posed to the public health, welfare and environment from the current extent of contaminant migration.

The first objective entails addressing the migration pathways of contaminated ground water. These pathways include further transport within the bedrock aquifer via ground water flow through bedrock fractures, surficial discharge or contaminated ground water via the upward component of ground water flow and migration of contaminants in surface water flow through ground water recharge.

The second objective entails addressing the exposure pathways, receptor populations and levels of exposure associated with contaminated ground water. Again, human health risks are the primary concern. Receptor populations identified include the people residing in homes along Exeter Road.

Target levels for remediating ground water are outlined in applicable or relevant and appropriate Federal public health and environmental requirements including: the Safe Drinking Water Act maximum contaminant levels (MCLs); the Office of Drinking Water Health Advisories; the Clean Water Act Ambient Water Quality Criteria; and RCRA Subpart F ground water corrective action regulations.

C. Technology Development and Screening

The "Guidance on Feasibility Studies Under CERCLA" dated June 1985 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) set forth the process by which remedial actions are evaluated and selected. The screening process consists of seven steps previously mentioned in the Introduction to this Section. Data for step one of the process (nature and extent of contamination) are provided by the Remedial Investigation Report and Supplemental Remedial Investigation Report. The threat presented by the contamination is evaluated in Section 8.0 of the Supplemental Remedial Investigation Report, Baseline Risk Assessment. Steps two through seven of the process are carried out in the Feasibility Study independently for source control and management of migration responses. The alternative selected for the KES Site consists of both a source control alternative and management of migration alternative.

Pursuant to §300.68(e) of the NCP, EPA determined general response actions, identified as response categories within the Feasibility Study, which are based on the results of the field investigation and the findings of the Remedial and Supplemental Remedial Investigation Reports. EPA then screened specific technologies considering the waste-limiting (waste characteristics that limit the effectiveness of a technology) and site-limiting (site characteristics such as high ground water table or soil permeability that preclude the use of a technology) factors unique to the site, and the level of technical development for each technology.

Tables V-1 and V-2 summarize the general response categories and the applicable technologies screened for source control and management of migration, respectively. Table V-3 presents the technologies which emerged from the screening process.

D. Development & Screening of Remedial Action Alternatives

Section 300.68(f)(1) of the NCP requires that, to the extent that is both possible and appropriate, at least one remedial alternative shall be developed as part of the Feasibility Study in each of the following categories:

- Alternatives for treatment or disposal at an off-site facility as appropriate;
- Alternatives that attain applicable or relevant and appropriate Federal public health and environmental requirements;
- As appropriate, alternatives that exceed applicable or relevant and appropriate Federal public health and environmental requirements;
- As appropriate, alternatives that do not attain applicable or relevant and appropriate Federal public health and environmental requirements but will reduce the likelihood of present or future threats from hazardous substances and that provide significant protection to public health and welfare and the environment. This must include an alternative that closely approaches the level of protection provided by alternatives that attain applicable or relevant and appropriate requirements.
- No action alternative.

This development of alternatives must also comply with SARA. Section 121(d) of CERCLA basically codifies EPA's CERCLA Compliance Policy. First published as an appendix to the preamble of the NCP, this policy requires that

TABLE V-1
REMEDIAL TECHNOLOGIES FOR SOURCE CONTROL

(1) **NO ACTION**

Site Security

(2) **CONTAINMENT**

Capping

- Multi-Layer Systems
- Surficial Stabilization

(3) **IN-SITU TREATMENT**

Aeration
Solvent Extraction
Soil Flushing
Aerobic Biogradation
Anaerobic Digestion
Enzymatic Degradation
Oxidation
Reductive Dechlorination
Neutralization
Hydrolysis
Enhanced Photolysis
In-Situ Heating
Artificial Ground Freezing
Vacuum Extraction
Vitrification
Thermoset Fixatives/Polymerization
Cement and Silicate based Fixatives/Grouting

(4) **REMOVAL**

Excavation

(5) **ON-SITE STORAGE**

Waste Pile
Storage Vault
Storage Bins
Storage Bags
Tank/Drum Storage

(6) **ON-SITE TREATMENT**

- Cement & Silicate based Fixatives/Grouting
- Thermoplastic Fixation
- Thermosets
- Surface Macroencapsulation
- Absorbents
- Vitrification
- Drying Beds
- Filtration
  - Pressure Filtration
- Classification
  - Screens and Sieves
  - Classifiers
- Carbon Adsorption
  - Powdered Activated Carbon Addition
- Evaporation
- Solvent Extraction
- Mechanical Aeration
- Anaerobic Digestion
- Composting
- Landfarming
- Enzymatic Degradation
- Oxidation
- Reduction
- Neutralization
- Hydrolysis (base-catalyzed)
- Rotary Kiln
- Cement, Lime & Aggregate Kiln Concentration
- Multiple Hearth Incineration
- High Temperature Fluid Wall
- Infrared Incineration

(7) **ON-SITE DISPOSAL**

RCRA Landfill

(8) **OFF-SITE TREATMENT**

RCRA Hazardous Waste TSD (Treatment/Storage Disposal) Facility

(9) **OFF-SITE DISPOSAL**

RCRA Landfill

TABLE V-2
REMEDIAL TECHNOLOGIES FOR MANAGEMENT OF MIGRATION

(1) NO ACTION

- Monitoring

(2) CONTAINMENT

- Slurry Walls
- Grout Walls
- Sheet Piling
- Block Displacement
- Bottom Seal Grouting

(3) DIVERSION

- Slurry Walls
- Grout Walls
- Sheet Piling
- Ground Water Interceptor Trench

(4) COLLECTION

- Ground Water Interceptor Trench
- Collector Wells

(5) IN-SITU TREATMENT

- Precipitation/Coagulation/Flocculation
- Carbon Adsorption
  - Permeable Bed Treatment
- Aerobic Biodegradation
- Anaerobic Digestion
- Oxidation
- Reduction
- Neutralization
- Hydrolysis (base-catalyzed)
- Electrolysis

(6) ON-SITE STORAGE

- Tank/Drum Storage
- Surface Impoundment

(7) ON-SITE TREATMENT

- Precipitation/Coagulation/Flocculation
- Sedimentation/Clarification/Gravity Thickening

(7) ON-SITE TREATMENT (continued)

- Powdered Activated Carbon Addition
- Ion Exchange
- Sorptive Resins
- Air Stripping
- Stream Stripping
- Distillation
- Dissolved Air Floatation
- Freeze Crystallization
- Solvent Extraction
- Coalescers
- Mechanical Aeration
- Filtration
- Granular Filtration
- Carbon Adsorption
  - Vapor and Liquid Phase Contractors
- Reverse Osmosis
- Ultrafiltration
- Electrodialysis
- Aerated Lagoons/Ponds
- Activated Sludge Reactors
  - Conventional
  - Step Aeration
  - Contact Stabilization
  - High Rate
  - Extended Aeration
  - High Purity Oxygen
  - Sequencing Batch
  - PACT
- Rotating Biological Disc
- Landfarming/Spray Irrigation
- Recirculation System
- Enzymatic Degradation
- Oxidation
  - Ultraviolet Ozonation
- Reduction
- Neutralization
- Hydrolysis
- Electrolysis
- Wet Air Oxidation
- Supercritical Water

(8) REMOVAL

- Extraction Wells
- Ground Water Interceptor Trench

TABLE V-2 (CONTINUED)
REMEDIAL TECHNOLOGIES FOR MANAGEMENT OF MIGRATION

(9) OFF-SITE TREATMENT

- Municipal Wastewater Treatment Facility
- RCRA Hazardous Waste Treatment
- Storage Disposal
  - Resource Recovery
  - Biodegradation
  - Chemical Treatment

(10) OFF-SITE DISPOSAL

- NPDES Discharge
  - Sewer Line
  - Surface Water
- Deep Well Injection

(11) ON-SITE DISPOSAL

- NPDES Discharge
  - Sewer Line
  - Surface Water
- Spray Application
- Seepage Basins and Ditches

TABLE V-3
TECHNOLOGIES APPLICABLE FOR REMEDIAL ALTERNATIVES

SOURCE CONTROL

(1) NO ACTION

Site Security

(2) COLLECTION

Capping

(3) IN-SITU TREATMENT

Soil Flushing
Vacuum Extraction

(4) REMOVAL

Excavation

(5) ON-SITE STORAGE

Waste Pile
Storage Bins

(6) ON-SITE TREATMENT

Mechanical Aeration
Low Temperature Thermal Stripping
Soil Washing
Biological Decomposition
Incineration

(7) ON-SITE DISPOSAL

RCRA Landfill

(8) OFF-SITE TREATMENT

RCRA TSD Facility

(9) OFF-SITE DISPOSAL

RCRA Landfill

MANAGEMENT OF MIGRATION

(1) NO ACTION

Monitoring

(2) COLLECTION

Ground Water Interceptor Trench (French Drain)

(3) IN-SITU TREATMENT

Aerobic Biodegradation

(4) REMOVAL

Ground Water Interceptor Trench (Overburden)
Extraction Well (Bedrock Only)

(5) ON-SITE TREATMENT

Vapor and Liquid Phase Carbon Adsorption
Air Stripping
Steam Stripping
Activated Sludge
Recirculation Systems

(7) OFF-SITE DISPOSAL

NPDES Discharge (Surface Water)
Ground Water Discharge

(8) OFF-SITE TREATMENT

Municipal Wastewater Treatment Facility
RCRA Hazardous Waste Treatment/Storage/Disposal Facility

(9) OFF-SITE DISPOSAL

NPDES Discharge (Surface Water)

Superfund remedial actions attain applicable or relevant and appropriate requirements (ARARs) of other Federal statutes. While Section 300.68(f) of the NCP specifically refers to ARARs in regard to the Development of Alternatives, CERCLA incorporates this requirement into statutory law, while adding the provision that remedial actions also attain State requirements more stringent than federal requirements if they are also applicable or relevant and appropriate and identified to EPA in a timely manner. The new statutory requirements and preference for treatment that reduces the volume, toxicity or mobility of hazardous waste, further modifies the process by which remedial alternatives are developed.

Alternatives developed and considered for initial screening at the KES Site are listed in Table V-4. The purpose of the initial screening is to narrow the list of potential remedial actions for further detailed analysis. Criteria listed in §300.68(g)(1)-Costs; (g)(2)-Acceptable Engineering Practice; and (g)(3)-Effectiveness of the NCP were used in the initial screening process. Consistent with Section 121(b)(2) of CERCLA, innovative technologies were carried through the screening process if they offered the potential for better treatment performance or implementability or less adverse environmental impacts than other available technologies or lower costs than demonstrated technologies. Results of the initial screening of alternatives process are presented in Table V-5 and V-6.

E. Detailed Analysis of Alternatives

After the initial screening, a detailed evaluation of each of the five source control alternatives and three management of migration alternatives remaining was conducted. Section 300.68(h) of the NCP states that a more detailed evaluation will be conducted of the limited number of alternatives that remain after the initial screening. The detailed analysis of each alternative shall, as appropriate, include:

1. Refinement and specification of alternatives in detail, with emphasis on use of established technology. Innovative or advanced technology shall, as appropriate, be evaluated as an alternative to conventional technology.

2. Detailed cost estimation including operation and maintenance costs and distribution of costs over time.

3. Evaluation in terms of engineering implementation, reliability, and constructability.

TABLE V-4
TECHNOLOGIES FOR INITIAL SCREENING

SOURCE CONTROL

SC-1	No Action (with fencing)	
SC-2	Capping	
	2A	Permeable Cap
	2B	RCRA Multi-Layered Cap
	2C	Surficial Stabilization
SC-3	In-Situ Treatment	
	3A	Vacuum Extraction
	3B	Soil Flushing
SC-4	On-Site Treatment	
	4A	On-Site Aeration
	4B	On-Site Soil Washing
	4C	On-Site Incineration
SC-5	On-Site RCRA Landfill	
SC-6	Off-Site Incineration	
SC-7	Off-Site RCRA Landfill	

MANAGEMENT OF MIGRATION

MOM-GW1	No Action (with monitoring)
MOM-GW1	In-Situ Biological Treatment
MOM-GW-3A	Air Stripping/Filtration/ Carbon Adsorption (discharge to stream)
MOM-GW3B	Air Stripping/Filtration/ Carbon Adsorption (discharge to ground water)
MOM-GW3C	Air Stripping/Biodegradation/ Filtration/Carbon Adsorption (discharge to groundwater)
MOM-GW4A	Off-Site Treatment at a RCRA Treatment Storage and Disposal Facility
MOM-GW4B	On-Site Air Stripping Pre-treatment with Off-Site Treatment at a Publicly Owned Treatment Works

TABLE V-5
SCREENING OF SOURCE CONTROL ALTERNATIVES

REMEDIAL ALTERNATIVE	COSTS	ENGINEERING PRACTICES/EFFECTIVENESS	COMMENTS
SC-1	$120,000 capital		
No Action (with fencing)	$10,000 Annually O&M for 30 years	1. Eliminate access to contaminated soil source areas. 2. Extends period of poor ground water by allowing continued release of contaminants from soil source to ground water.	This alternative has been retained for detailed evaluation as a basis for comparison to other alternatives as specified in §300.68(f)(1)(v) of the NCP.
SC-2			
Permeable Capping			
A. Permeable Cap	$305,000 Capital $24,000 Annually O&M	1. Eliminate access to contaminated soil source areas.	Alternative SC-2C has been retained for detailed evaluation while SC-2A and SC-2B have been screened out. A multi-layered RCRA cap will prevent further migration of contaminants into ground water, will prevent leachate seeps and provide a physical barrier. It will provide greater environmental and public health protection than SC-1, despite an order of magnitude greater costs. SC-2A and SC-2B have been screened out in accordance with
B. Surficial Stabilization	$243,000 Capital $26,000 Annually O&M	2. Extends period of poor ground water by allowing continued release of contaminants from soil source to ground water.	
C. RCRA Multi-Layered Cap	$2,000,000 Capital	3. Restricts future use of site.	

TABLE V-5 (CONTINUED)
SCREENING OF SOURCE CONTROL ALTERNATIVES

REMEDIAL ALTERNATIVE	COSTS	ENGINEERING PRACTICES/EFFECTIVENESS	COMMENTS
SC-2 (continued)	$40,000 Annually O&M	4. SC-2B and SC-2C will prevent infiltration into contaminated soils and therefore limit migration of contaminants.	§300.68(g)(3) in that they do not effectively contribute to the protection of public health and welfare and the environment in comparison SC-2C.
SC-3C			
In-Situ Treatment			
A. Vacuum Extraction	$400,000 to $650,000 Capital	1. Eliminate access to contaminated source areas.	Alternative SC-3A has been retained for detailed development because it provides greater environmental and public health benefits than SC-1. Site conditions are also amenable to effective implementation of this treatment method.
	$1,000,000 to $1,500,000 Annually O&M for 2 years	2. Reduction or elimination of contaminants in soil source areas.	
		3. Unimpeded future use of site.	
		4. Removal of hazardous nature of soil source area without problems associated with excavation.	
		5. Eliminates hazard from spills associated with transport of contaminated soils.	

TABLE V-5 (CONTINUED)
SCREENING OF SOURCE CONTROL ALTERNATIVES

REMEDIAL ALTERNATIVE	COSTS	ENGINEERING PRACTICES/EFFECTIVENESS	COMMENTS
B. Soil Flushing	$1,400,000 Capital	6. Mitigates potential for off-site migration of contaminants after treatment is completed.	Alternative SC-3B has been retained for detailed evaluation under alternatives MOM-3B and 3D. They involve collection and treatment of ground water followed by recharge back to the ground as a disposal method for the treated water.
	$190,000 Annually O&M 5 years	7. Potential release of air emissions from treatment (SC-3A only).	
		8. Potential increase of contaminants entering ground water during short-term impact of treatment.	
		9. Generation of residuals after treatment that requires handling of disposal.	
SC-4			
On-Site Treatment (with excavation)	$3,400,00 Capital	1. Eliminate access to concontaminated soil source areas.	Alternative SC-4A and SC-4B were retained for detailed development since they have the same environmental benefits for treating organic-contaminated soils and equipment costs.
A. On-Site Aeration	$2,500,000 O&M (2-3 years)	2. Unimpeded future use of site.	
		3. Mitigates potential for off-site migration of contaminants.	

TABLE V-5 (CONTINUED)
SCREENING OF SOURCE CONTROL ALTERNATIVES

REMEDIAL ALTERNATIVE	COSTS	ENGINEERING PRACTICES/EFFECTIVENESS	COMMENTS
B. On-Site Soil Washing	$6,500,000 Capital $1,500,000 O&M 2-2 1/2 years	4. Potential release of air emissions due to excavation. 5. Potential release of air emissions due to excavation.	Alternative SC-4C was screened out in accordance with §300.68(g) (1) and (3). The costs are an order of magnitude greater than those for SC-4A and 4B, without providing significantly greater environmental benefits.
C. On-Site Incineration	$13,300,000 Capital $6,000 Annual O&M 2-2 1/2 yrs.	6. Generation of residuals after treatment. 7. Adverse environmental impact of treatment on the neighborhood.	
SC-5			
On-Site RCRA Landfill	$1,400,000 Capital $42,000 Annual O&M	1. Eliminate access to contaminated soil source areas. 2. Mitigates potential for off-site migration of contaminants. 3. Restricts future use of site. 4. Potential release of air emissions. 5. Potential releases associated with excavation.	This alternative has been screened out in accordance with §300.68(g)(3). This alternative is of less environmental benefit than the on-site treatment alternative, SC-4 and it is of less benefit to public health, due to excavation activities, when compared to the capping alternative SC-2.

TABLE V-5 (CONTINUED)
SCREENING OF SOURCE CONTROL ALTERNATIVES

REMEDIAL INVESTIGATION	COSTS	ENGINEERING PRACTICES/EFFECTIVENESS	COMMENTS
SC-6			
Off-Site Incineration	$34,000,000	1. Eliminate access to con- soil source areas. 2. Mitigates potential for off-site migration of contaminants. 3. Unimpeded future use of site. 4. Potential for releases associated with excavation. 5. Potential for releases and safety problems due to extensive handling and transportation.	This alternative has been screened out on the basis of §300.68(g)(1) and (3). The environmental benefit for off-site incineration was not significantly greater than off-site land disposal alternative SC-7 although the cost of incineration is greater.
SC-7			
Off-Site RCRA Landfill	$15,000,000	1. Eliminate to contaminated soil source areas. 2. Unimpeded future use of site. 3. Mitigates potential for off-site migration of contaminants. 4. Potential for releases associated with excavation. 5. Potential for releases and safety problems due to extensive handling and transportation.	This alternative has been retained because it has a better environmental impact than corresponding on-site alternatives due to the existence of a properly sited and operating facility.

TABLE V-6
SCREENING OF MANAGEMENT OF MIGRATION ALTERNATIVES

RESIDENTIAL ALTERNATIVE	COST	ENGINEERING PRACTICES/EFFECTIVENESS	COMMENTS
MOM-GW1 No Action	$35,000 Capital $30,000/yr O&M	1. Ground water will cleanup with time as a result of natural processes. 2. Includes monitoring to detect off-site contamination that could threaten other nearby residential areas. 3. Requires institutional controls restricting the use of the aquifer. 4. No release from future liability if contamination migrates off-site.	This alternative may be viable for this site and has been retained for detailed development to provide a basis for comparison to other other alternatives as stipulated in $300.68(f)(1)(v) of the NCP.
MOM-GW2 In-Situ Biological Treatment	$36,000 Capital $14,400/yr O&M	1. As above 2. May accelerate the cleanup of ground water. 3. As above 4. Does not actively control ground water contamination continued discharge and migration of contaminants 5. Uncertainty involved in areal extent of treatment effectiveness. 6. Will not breakdown all compounds present.	This alternative has been screened out on the basis of $300.68(g)(2). Although this alternative is not a proven technology, it has shown promise as a passive treatment system. However the time required to attain targeted levels may approach that of the no-action alternative. (Considering that naturally occurring processes have already reduced contaminant levels).

TABLE V-6 (CONTINUED)
SCREENING OF MANAGEMENT OF MIGRATION ALTERNATIVES

RESIDENTIAL ALTERNATIVE	COST	ENGINEERING PRACTICES/EFFECTIVENESS	COMMENTS
MOM-GW3 On-Site Treatment			
A. Air Stripping Filtration/Carbon Adsorption (Discharge to stream)	$218,000 Capital $22,000/yr O&M	1. As above 2. As above 3. Release from future liability 4. Does not restrict future or require institutional controls	Alternative MOM-GW3 has been screened out on the basis of $300.68(g)(2). Discharge of treated ground water to local waterways generally requires extensive regulatory review and permitting. Alternative MOM-GW3C has been screened out in accordance with $300.68(g)(3). MOM-GW3C provides no more environmental or public health benefits than MOM-GW3B and there are greater uncertainties associated with the effectiveness of biodegradation.
B. Air Stripping Filtration/Carbon Adsorption (Discharge to ground water)	$700,000 Capital $250,000 Yr-O&M	5. Construction of facility may create negative visual impacts.	
C. Air Stripping Biodegradation/ Filtration/Carbon Adsorption	$800,000 Capital $200,000/Yr. O&M		

TABLE V-6 (CONTINUED)
SCREENING OF MANAGEMENT OF MIGRATION ALTERNATIVES

RESIDENTIAL ALTERNATIVE	COST	ENGINEERING PRACTRICES/EFFECTIVENESS	COMMENTS
MON-GW4 Off-Site Treatment			
A. TSD Facility	$217,000 Capital $1,000,000 Year/O&M.	1. As above 2. Will not breakdown all compounds present. 3. Release from future liability.	MON-GW4B has been screened out in accordance with §300.68(g)(2). Ground water is considered a hazardous material and can only be trucked to a RCRA permitted TSD Facility.
B. POTW with On-Site Air Stripping	$145,000 Capital $300,000 O&M	4. Does not restrict future use or require institutional controls. 5. Potential for spills during transport via trucking or in sewer line.	

NOTES: (300,000 O&M) O&M Costs are user fees or tipping fees for disposal of contaminated ground water which will be incurred over the life of removal scheme.

(Costs) O&M costs given are annual costs (no present analysis was performed)

4. An assessment of the extent to which the alternative is expected to effectively prevent, mitigate or minimize threats to and provide adequate long-term protection of public health, welfare and the environment. This includes an evaluation of the extent to which the alternative attains or exceeds applicable or relevant and appropriate Federal public health and environmental requirements (ARARs). Where the analysis determined that public health and environmental requirements are not applicable or relevant and appropriate, the analysis, as appropriate, evaluates the risks of the various exposure levels projected or remaining after implementation of the alternative under consideration.

5. An analysis of whether recycle/reuse, waste minimization, waste biodegradation, destruction, or other advanced, innovative or alternative technologies is appropriate to reliably minimize present or future threats to public health or welfare or the environment.

6. An analysis of any adverse environmental impacts, methods for mitigating these impacts and costs of mitigation. In addition, Section 121(b) of CERCLA requires that remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment. The offsite transportation and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available. The President shall conduct an assessment of permanent solutions and alternative treatment technologies or resource recovery technologies that, in whole or in part, will result in a permanent and significant decrease in the toxicity, mobility, or volume of the hazardous substance, pollutant or contaminant. In making such assessment, the President shall specifically address the long-term effectiveness of various alternatives. In assessing alternative remedial actions, the President shall, at a minimum, take into account:

A. The long-term uncertainties associated with land disposal.

B. The goals, objectives and requirements of the Solid Waste Disposal Act.

C. The persistence, toxicity, mobility and propensity to bioaccumulate of such hazardous substances and their constituents.

D. Short and long-term potential for adverse health effects from human exposure.

E. Long-term maintenance costs.

F. The potential for future remedial action costs if the alternative remedial action in question were to fail.

G. The potential threat to human health and the environment associated with excavation, transportation and redisposal or containment.

The Office of Solid Waste and Emergency Response (OSWER), through Directive 9355.01-21, consolidates the evaluation criteria from both §300.68(h) of the NCP and §121(b) of CERCLA into nine key criteria. The nine criteria are:

1. Reduction of Toxicity, Mobility or Volume

2. Implementability and Reliability

3. Short-term Effectiveness

4. Compliance with ARARs

5. Long-term Effectiveness

6. Cost

7. Community Acceptance

8. State Acceptance

9. Overall Protectiveness of Human Health and the Environment

These nine criteria were used in evaluating each of the alternatives which passed the initial screening. The evaluation in respect to criteria 1-6 is presented in Table V-7 through V-14. Criteria 9, Overall Protectiveness of Human Health and the Environment, is discussed following the discription of each alternative. With respect to Criteria 7, Community Acceptance, EPA has received no comments from local residents during the formal comment period. The comments EPA has received from others are included in the Administrative Record. These comments are summarized and responded to in the Responsiveness Summary attached hereto. In regard to Criteria 8, State Acceptance, the New Hampshire Department of Environmental Services (DES) has reviewed the various alternatives and has indicated its support for the selected remedy.

1. SC-1 -- NO ACTION

Under the No-Action Alternative for source control, contaminated soils identified during the field screening and laboratory analysis programs, will remain in place. Public access to the Site will be limited by use of the existing fence surrounding the Site. The existing buildings on-site will remain under this alternative as well as with all source control alternatives under consideration. Measures such as loaming and seeding the Site will be instituted along the south and west borders of the Site. Fence maintenance and sampling programs will be implemented and continued for 30 years or until contaminant levels in soils decreased through natural processes to a point where they no longer presented a threat to public health or the environment.
The sampling program will consist of obtaining ten soil samples every three months for the 30-year period.

Levels of contamination detected in soils on-site do not present a significant health risk in terms of dermal contact, inhalation or subsequent ingestion. However, the downward migration of contaminants from soils to the ground water may prolong the poor quality of the ground water and increase the potential for off-site migration to residences along Exeter Road. Assuming factors for ground water recharge rate, soil moisture content, annual percent decrease in contaminant concentration, area of contaminated soils, and no chemical and/or biological degradation, mathematical analysis estimates that as long as 200 years may be needed for the ground water beneath the Site to reach drinking water quality.

A summary analysis of the No-Action Alternative in accordance with the first six OSWER criteria is presented in Table V-7. The overall ranking for the no-action alternative is low for protection of human health and the environment based on its lack of compliance with ARARs, its failure to reduce toxicity, mobility or volume and its lack of long-term effectiveness to protect public health and the environment.

2. SC-2 -- CAPPING

This alternative consists of constructing a multi-layered impermeable cap over the entire 7.4 acre KES Site (323,000 ft.). The multi-layered cap design consists of a three-layered system which has an upper vegetative layer, underlain by a drainage layer over a low permeability layer. The vegetative layer is supported by the topsoil layer, the drainage layer is composed of sand or gravel and the low permeability layer consists of a combined synthetic and soil liner system. This design is consistent with the requirements of the Resource Conservation and Recovery Act as

TABLE V-7

SC-1 - NO ACTION EVALUATION

Remedial Alternative	Reduction of Toxicity, Mobility or Volume	Reliability	Implementability Constructability	Short-Term Effectiveness	Compliance with ARARs	Long-Term Effectiveness
SC-1 No Action	Low	Medium	High	Medium	Low	Low
Fencing/ Monitoring Overall Ranking Low Capital Cost $178,200 Present Value of O & M Costs $394,800 Total Present Worth Costs $573,000	Contaminants can be isolated from the population eliminating the threat of direct contact. Contaminants will continue to leach from the soils to the groundwater. Will not significantly or permanently reduce volume, toxicity or mobility of contamination.	The fence may be damaged or vandalized no longer effectively restricting site access.	Simple construction techniques needed to vegetate and fence the site. Monitoring program can be implemented with little difficulty.	Although personnel will not be required to directly handle hazardous wastes, they will be working with contaminated soils during the vegetation operation.	Does not comply with RCRA-40 CFR Part 264 Subparts F (Groundwater Protection), G (Closure and Post-Closure), Executive Order 11990; and Fish and Wildlife Coordination Act. Does not comply with the intent of SARA to permanently or significantly reduce the volume, toxicity or mobility of contaminants. Contaminants are left on site, requiring 5-year SARA review.	Contaminants are not removed or rendered non-hazardous. Contaminant contact with a seasonally high water table is possible. Future site and area development restricted.

TABLE V-8

SC-2 - CAPPING EVALUATION

Remedial Alternative	Reduction of Toxicity, Mobility or Volume	Reliability	Implementability Constructability	Short-Term Effectiveness	Compliance with ARARs	Long-Term Effectiveness
SC-2 Capping entire site with multi-layer RCRA cap Overall Ranking Low Capital Costs $2,182,400 Present Value of O & M Cost $902,500 Total Present Worth Costs $3,084,900	Low Eliminates direct or wind blown exposure. Contaminated soils are not removed. Will not significantly reduce the volume or toxicity of contamination. Will reduce the mobility of contaminants, but rising water table could still contact contaminated soils. Percolation of rainfall is eliminated, but leaching through contact with groundwater is not.	Medium Liner design has a finite life of approximately 20-30 years. Capping technologies have been successfully used at other Superfund sites. Subject to failure due to differential settlement of soils.	High Relative ease of installation. Monitoring program can be implemented with little difficulty. Requires periodic maintenance of vegetative cover.	Medium Potential exposure of workers and residents to fugitive dust and vapor emissions during implementation.	Low Complies with RCRA 40 CFR Part 264 Subparts G (Closure and Post-Closure); Executive Order 11990 and the Fish & Wildlife Coordination Act. Does not comply with RCRA 40 CFR Part 264, Subpart F. Does not comply with the intent of SARA to permanently or significantly reduce the volume or toxicity of contaminants. Reduces mobility, but rising water table may be a problem. Contaminants are left on site, requiring 5-year SARA review.	Low Contaminants are not removed or rendered non-hazardous. Contaminant contact with a seasonally high water table is possible. Cap has an expected life of 20-30 years. Future site development remains limited.

amended in 1984. In addition to construction costs, operation and maintenance of the cap for a thirty-year period will include maintenance of the vegetative top layer, well sampling and erosion control.

The purpose of a cap is to control the migration of wastes as well as prevent the assimilation of the contaminated source areas with non-contaminated media. A cap can mitigate these conditions by acting as an infiltration barrier. However, seasonal fluctuation in the ground water table can result in the continued leaching of contaminants into the ground water.

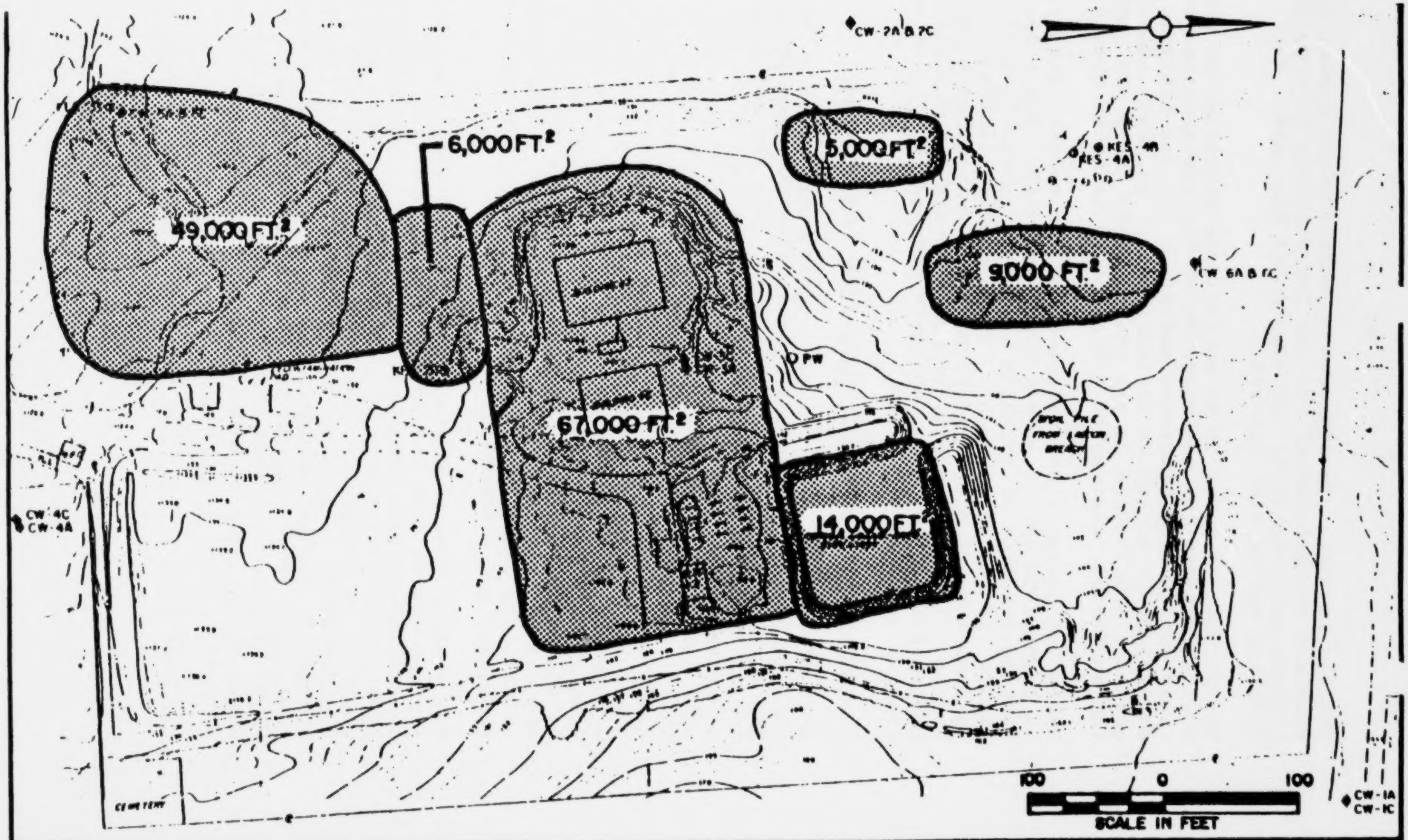
Table V-8 presents an evaluation of the capping alternative in respect to the first six OSWER criteria. The overall ranking for this alternative is low for protection of human health and the environment. While capping limits mobility of contaminants, there is no permanent or significant reduction in the volume or toxicity of contaminants. The leaching of contaminants through contact with seasonal rising water table remains a concern.

3. SC-3A -- IN-SITU TREATMENT (Vacuum Extraction)

This alternative involves the in-place treatment of soil contamination using a technology called vacuum extraction. Vapor extraction wells are installed into the soils above the ground water table. Vacuum piping is attached to each well and also to a vacuum pump. The pump creates a vacuum at each well and causes air to flow from the surrounding soils to the wells. As the air passes over the contaminated soils, a mass transfer between the contamination and the air occurs. The contaminated air is then collected from each well through the vacuum piping to a condenser where moisture is removed. Finally, the contaminated air is sent through columns of activated carbon where the contaminants are removed prior to the air being discharged to the atmosphere. Operation and maintenance costs for this alternative include power, personnel and monitoring.

The maximum area requiring vacuum extraction is estimated at 150,000 square feet and is shown on Figure V-1. Approximately five years of treatment will be necessary to lower the concentration of contamination in this area of soils to an acceptable level. Target concentration levels are discussed in Section VI.A.2. and VI.B.1. of this Summary. During the initial design phase of this alternative, a soil sampling program will be implemented to verify soil areas which require treatment. Soils which exceed the cleanup goals established in Section VI.B.1. of this Summary will be treated.

Although classified as an innovative process, vacuum extrac-


49,000 FT.²
6,000 FT.²
67,000 FT.²
5,000 FT.²
9,000 FT.²
14,000 FT.²
CW-2A B 7C
KES-4B
KES-4A
CW 6A B 6C
PW
CW-4C
CW-4A
CW-1A
CW-1C
CEMETERY
100
0
100
SCALE IN FEET

KEEFE ENVIRONMENTAL SERVICES
EPPING, NEW HAMPSHIRE
CAMP DRESSER & McKEE
AUGUST 1987

FIGURE V-1

ESTIMATED AREAS OF CONTAMINATED SOILS

TABLE V-9

SC-3A - VACUUM EXTRACTION EVALUATION

Remedial Alternative	Reduction of Toxicity Mobility or Volume	Reliability	Implementability Constructability	Short-Term Effectiveness	Compliance with ARARs	Long-Term Effectiveness
SC-3 In situ Treatment A. Vacuum Extraction Overall Ranking High Capital Cost $1,138,300 Present Value of O & M Cost $3,193,900 Total Present Worth Cost $4,332,200	High Treatment of soils removes threat. Eliminates leaching from contaminated soils to the groundwater. Treatment of soils results in a permanent and significant reduction in the volume toxicity and mobility of contaminants.	Medium Treatment Technology has been successfully used in clean-up of chemical spills. This technology is currently being developed for hazardous waste sites. Pilot studies are required.	High Relative ease of implementation when compared to remedial technologies requiring soils excavation and handling.	Medium Minimal worker and resident exposure to possible vapor emissions during the treatment process. Possible vapor emissions from extraction & treatment operations.	High Complies with RCRA 40 CFR Part 264 Subparts F, G, J; Executive Order 11990, and the Fish & Wildlife Coordination Act. Complies with the intent of SARA in that a permanent reduction in volume, toxicity and mobility of contaminants is provided.	High Removal of contaminants from the soils will mitigate downward migration of contaminants to the groundwater, and accelerate groundwater clean-up. Removal of contaminants from the soils reduces the risk of dermal contact and ingestion of contaminants.

tion has been used successfully in pilot studies in California and Minnesota. This process is also being demonstrated and evaluated for use at a Superfund Hazardous Waste Site in Massachusetts.

Table V-9 presents an evaluation of this alternative with respect to the first six OSWER criteria. This alternative received an overall ranking of high for protection of human health and the environment, because it eliminates leaching of contaminants from soils to the ground water by permanently and significantly reducing the volume and toxicity of contaminants. This alternative complies with all applicable or relevant and appropriate Federal and State requirements.

4. SC-4A -- EXCAVATION OF CONTAMINATED SOILS WITH ON-SITE TREATMENT (Low Temperature Thermal Stripping)

Low temperature thermal stripping requires the excavation of contaminated soils and consolidation into a central area for processing. The process itself consists of a mechanical aeration system, such as a rotary drum or screw auger device. The soils are heated and induced air flow applied. Contaminants are released from the heated soils by the churning action.

The induced air flow captures the contaminants and passes them to an after burner for destruction. Treated soils will be sampled and analyzed to ensure that the proper degree of treatment is achieved. The soils will then be used on-site for grading. Operation and maintenance of this system includes power, fuel, personnel, equipment, rental equipment, sampling and analysis.

Results from several pilot studies on heavily contaminated soils has demonstrated that greater than 99 percent removal of volatile organic compounds can be achieved. A maximum of approximately 20,800 cubic yards of contaminated soils will be treated. Assuming the process will treat 10,000 pounds of contaminated soils per hour for 12 hours per day, the operation would be expected to be complete within two to three years. As with alternative SC-3A, actual quantities of soils to be treated will be verified through a detailed soil sampling program during design.

Table V-10 presents an evaluation of the Low Temperature Thermal Stripping Alternative with respect to the first six OSWER criteria. This alternative received an overall ranking of high for protection of human health and the environment as it eliminates leaching of contaminants from soils to the ground water by permanently and significantly reducing the volume and toxicity of contaminants. This alternative will also comply with all applicable or relevant and appropriate

TABLE V-10

SC-4A/4B - LOW TEMPERATURE THERMAL STRIPPING/
SOIL WASHING EVALUATION

Remedial Alternative	Reduction of Toxicity Mobility or Volume	Reliability	Implementability Constructability	Short-Term Effectiveness	Compliance with ARARs	Long-Term Effectiveness
SC-4	High	High	High/Medium	Medium	High	High
Excavation of Contaminated Soils with on-site treatment	Removal of soils removes threat.	Technology has been used and demonstrated to be effective at other hazardous waste sites.	Process equipment for thermal stripping of contaminants from soils can be obtained with little difficulty.	Minimal worker and resident exposure to possible vapor emissions during the treatment process.	Complies with RCRA 40 CFR Part 264 Subparts G, L, N; Executive Order 11990, and the Fish & Wildlife Coordination Act.	Removal of contaminants from the soils will mitigate downward migration of contaminants to the groundwater, and accelerate groundwater clean-up.
A. Low Temperature Thermal Stripping	Eliminates leaching of contaminants from soils to groundwater.		Mobilization and start-up of process equipment is relatively easy.	Potential of worker exposure to contaminated soils during excavation and soils handling operations.	Complies with the intent of SARA in that a permanent reduction in volume, toxicity and mobility of contaminants is provided.	Removal of contaminants from the soils reduces the risk of dermal contact and ingestion of contaminants.
B. Soil Washing			Excavation and treatment equipment subject to adjutment, maintenance and breakdown.	Possible fugitive dust and vapor emissions from soils excavation and handling, and from treatment operations.		
Overall Ranking High						
Capital Costs of Thermal Stripping $3,905,000						
Present Value of O & M Cost of Thermal Stripping $2,614,000						
Total Present Worth Costs of Thermal Stripping $6,519,000						
Capital Costs of Soil Washing $6,705,000						
Present Value of O & M Costs of Soil Washing $1,720,700						
Total Present Worth Costs of Soil Washing $8,425,700						

Federal and State requirements.

5. SC-4B -- EXCAVATION OF CONTAMINATED SOILS WITH ON-SITE TREATMENT (Soil Washing)

The soil washing alternative involves excavation, mixing of the soil with a leaching medium and extraction of the leaching medium and associated contamination from the soil. The contaminated soils are passed through a series of reaction vessels where they are mixed with a leaching medium. The leaching medium "washes" the contaminants from the soils. For the contaminants at the KES Site, a water/surfactant or water/methanol rinse is considered to be technically feasible and cost effective. Pilot studies conducted during design of this system will determine which of the two extract solutions is most suitable.

The soil/water mixture is then transferred to a plate and frame filter press for dewatering of the "cleaned" soils. The dewatered soils are returned to the excavation. The contaminated leachate would be treated by a ground water treatment system. In addition to the capital expense for equipment, operation and maintenance of the alternative includes personnel, replacement of leaching medium, power, sludge disposal, sampling and analysis. Operation is expected to last for two years based on processing 10,000 lbs./hr., 12 hrs./day, 5 days/week. Actual volume of soils to be treated will be verified during the initial phase of design.

Soil washing/extraction has been applied at a number of industrial, defense and Superfund sites throughout the country, as well as several industrial sites in Europe. The primary contaminants that this technology has been applied to in the past are heavy metals such as lead, mercury and chromium. The mining industry has also utilized this technology for the recovery of gold, silver and other precious metals. The petroleum industry has for many years used the extraction process for the removal of phenolics, pyridines and quinolines from crude coal tars with the use of caustic and acid washes.

Table V-10 presents an evaluation of Soil Washing with respect to the first six OSWER criteria. This alternative received an overall ranking of high for protection of human health and the environment. As with alternative SC-4A, soil washing is a proven technology which will permanently and significantly reduce the volume and toxicity of contaminants.

6. SC-7 -- OFF-SITE DISPOSAL (RCRA Landfill)

The off-site disposal alternative entails the excavation of contaminated soil with disposal at a RCRA approved off-site landfill. The procedures necessary to implement this alternative include excavation, dewatering, transportation, disposal and site restoration.

After the soil is excavated, the moisture content of the soil must be reduced before it can be transported in accordance with RCRA 40 CFR Section 264.314. Several options for the dewatering process include mechanical dewatering (i.e. a rotary kiln), open bed aeration and the addition of absorbent material to the soils. Mechanical dewatering, in the form of a rotary kiln, is preferred because it does not generate an aqueous sidestream and can also achieve the smallest volume. Operation and maintenance costs for this alternative are low in comparison to the other source control alternatives. This is because excavation and hauling would be performed by a contractor and are considered part of the capital expense.

Operation and maintenance will include on-site personnel for overview, maintenance of the fence and labor and equipment for erosion control. This alternative will require approximately one year of operation.

Table V-11 presents an evaluation of Off-Site Disposal with respect to the first six OSWER criteria. The overall ranking of this alternative is medium for protection of human health and the environment. Although the contaminated soils are removed from the Site, this alternative does not result in a permanent reduction in the volume or toxicity of the contamination as required by CERCLA Section 121.

7. MOM-GW1 -- NO ACTION

This alternative involves a long-term monitoring effort to assess off-site migration of contaminants and any subsequent impacts which may result if this alternative is chosen. As migration proceeds from source areas to the Site boundaries, natural processes act to reduce contaminant levels in the various environmental media. These processes include volatilization, biodegradation and dilution with contaminant-free water. The no-action alternative depends upon these processes to significantly minimize off-site contaminant migration. If adverse off-site impacts occur, corrective action is required.

Groundwater monitoring includes evaluating background water quality and the water quality leaving the Site. Background water quality can be assessed by monitoring upgradient wells CW-1A and CW-1C.

Downgradient monitoring wells CDM-1A, CDM-2B, CDM-3A, CDM-3B, CDM-5A and CDM-5B can be used to assess the ground

TABLE V-11

SC-7 - OFF-SITE DISPOSAL EVALUATION

Remedial Alternative	Reduction of Toxicity Mobility or Volume	Reliability	Implementability Constructability	Short-Term Effectiveness	Compliance with ARARs	Long-Term Effectiveness
SC-7 Excavation of Contaminated Soils and Off-site Disposal in a RCRA Landfill Overall Ranking Medium Capital Cost $18,464,000 Present Value of O & M Cost $19,300 Total Present Worth Cost $18,483,300	Medium Removal of soils removes threat from the Keefe site. Eliminates leaching from contaminated soils to the groundwater. There is no permanent reduction in the volume or toxicity of contaminants as contaminated soils are relocated rather than treated.	Medium Technology has been used and demonstrated to be effective at other hazardous waste sites. Potential risk of release of contaminants from the RCRA Landfill.	Medium Excavation techniques are relatively simple. Logistical problems associated with transport to other parts of the country.	Medium Possible fugitive dust and vapor emissions from soils excavation and handling. Potential exists for exposure to the public due to accident during transport. Nearby residents, especially children at a greater risk due to increased truck traffic.	Low Complies with RCRA 40 CFR Part 264 Subparts G, L, N; Executive Order 11990, and the Fish & Wildlife Coordination Act. Does not comply with the intent of SARA as offsite disposal without treatment does not provide a permanent solution and is a least favored alternative.	Low Contaminants are removed from the site and further contamination of the groundwater is mitigated. Potential exists for failure of or future response work at the RCRA Landfill. Removed contaminated soils remain in hazardous form, volume and toxicity.

water quality of flow exiting the Site. Under the no-action response, additional monitoring wells are installed to monitor ground water quality flowing off-site in the vicinity of the Unnamed Tributary. These wells form a cluster with one well in the overburden and one well in the bedrock. Residential wells along Exeter Road also would have be sampled.

A quarterly sampling and analysis of these wells would be conducted until the potential threat is eliminated. The - sampling results would be evaluated regularly in order to estimate plume migration and dispersion potential off-site. The quarterly sampling is anticipated to extend over at least a ten-year period, after which fewer wells may be monitored on a bi-yearly basis. If data from the previous monitoring results strongly indicate that there is no potential threat, the monitoring may be stopped. Migration of contaminants off-site into the Unnamed Tributary would be monitored on a quarterly basis for at least five years. The time to reach acceptable cleanup levels in ground water beneath the source soils is estimated to be 200 years (ref. to discussion for SC-1, No Action).

Table V-12 presents an evaluation of the No-Action Alternative for the management of migration with respect to the first six OSWER criteria. This alternative received an overall ranking of low for the protection of human health and the environment because it does not provide for the permanent reduction of volume, toxicity or mobility of contaminants and does not comply with applicable or relevant appropriate Federal and State requirements.

8. MOM-GW3B -- ON-SITE TREATMENT:AIR STRIPPING/FILTRATION/ CARBON ADSORPTION (Discharge to Groundwater)

This alternative involves removing contaminated ground water from both the sand and gravel deposits and the bedrock aquifer on the Site. Ground water removal will be accomplished using collection trenches in the sand and gravel deposits, and existing bedrock wells. The ground water would be pumped to a vessel where it will be allowed to trickle down over a packing material while air is forced upward. As the air passes over the contaminated ground water, the contaminants are stripped from the ground water and are carried off with the air stream. The air stream containing the contaminants is then treated in activated carbon columns prior to release to the atmosphere. Ground water from the air stripper would also receive further treatment with activated carbon before discharge to a ground water recharge area adjacent to the wetland along the western border of the Site.

TABLE V-12

MOM-GW1 - NO ACTION EVALUATION

Remedial Alternative	Reduction of Toxicity Mobility or Volume	Reliability	Implementability Constructability	Short-Term Effectiveness	Compliance with ARARs	Long-Term Effectiveness
MOM-GW1	Medium/Low	Low	High	Low	Low	Low
No Action Overall Ranking Low Capital Costs $36,800 Present Value of O & M Costs $1,008,000 Total Present Worth Costs $1,044,800	The natural cleansing of the aquifer will take many years. No stress has been observed in the Wetlands. Potential receptors are currently not being impacted via drinking water.	On other sites with similar contaminants, the time estimated for natural cleansing of the aquifer ranged from 50 to 200 years.	Construction and implementability are easily accomplished. Costs are low. Continued groundwater monitoring is easily implemented.	Even though recent well tests do not indicate the presence of contaminants, the threat of continued migration of contaminated groundwater to potential users remains.	Does not comply with RCRA-40 CFR Part 264 Subpart F; Executive Order 11990; Groundwater Protection Strategy; and Fish and Wildlife Coordination Act. Does not comply with Sara requirement of permanent reduction in volume, toxicity, or mobility of contaminants. Contaminants are left on site requiring 5-year SARA review.	Groundwater remains contaminated. Potential for future contamination of nearby domestic wells. Natural restoration of the aquifer will be gradual, taking many years. Future development in the area will result in increased groundwater pumping and therefore increased migration potential.

Operation and maintenance costs for this alternative include labor for operations and maintenance, chemicals, power, materials and supplies, water and metal sludge disposal. Chemical costs are estimated based on the chemical required for pH adjustment, coagulation and carbon. Disposal costs include the cost for sludge disposal at an approved facility. Assuming a ground water removal rate of 4-7 gallons per minute and implementation of a source control treatment alternative, approximately five years will be required to attain an acceptable cleanup level in the ground water. With no soil treatment, a significantly longer period of ground water treatment may be necessary.

Table V-13 presents an evaluation of this alternative with respect to the first six OSWER criteria. The overall ranking for this alternative is high for protection of human health and the environment because it provides permanent treatment significantly reducing the toxicity of the contamination. This alternative also complies with all applicable or relevant and appropriate Federal and State standards.

9. MOM-GW4A -- OFF-SITE TREATMENT AT TSD FACILITY

This alternative entails extraction of contaminated ground water, bulk containerization and transportation to a RCRA Treatment, Storage and Disposal (TSD) facility. It should be noted that §121 of CERCLA states that off-site transport or disposal without treatment is a least favored alternative. This alternative uses the same extraction scenario as described in MOM-GW3B. The contaminated water, which is pumped from the bedrock wells and collection trench, is temporarily held in storage tanks on-site for transport to an off-site RCRA treatment storage and disposal facility. An estimated volume of between 42,000 and 72,000 gallons of contaminated ground water will be disposed of weekly. Operation and maintenance costs for this alternative include personnel for operating and maintaining the pumping facility, power, effluent disposal, sampling analysis. Assuming the same ground water removal rates as with Alternative MOM-GW3B and implementation of a source control treatment alternative, approximately five years of pumping will be necessary to restore the ground water to drinkable quality.

Table V-14 presents an evaluation of this alternative with respect to the first six OSWER criteria. Although this alternative provides a permanent reduction in the volume of contamination, it is given an overall ranking of only Medium for protection of human health and the environment due to increased safety risks associated with the transport of contaminated ground water.

TABLE V-13

MOM-GW3B - AIR STRIPPING EVALUATION

Remedial Alternative	Reduction of Toxicity Mobility or Volume	Reliability	Implementability Constructability	Short-Term Effectiveness	Compliance with ARARs	Long-Term Effectiveness
MOM-GW3B Removal with On-Site Treatment	High	High	Medium/High	High	High	High
A. Air Stripping with Carbon Adsorption and Discharge to Groundwater	Will treat groundwater to MCLs.	Unit processes and similar systems have proven successful at other Superfund sites.	The process equipment is substantially self-contained and has been constructed and operated at other sites with little difficulty.	Excavation of trenches for collection of groundwater in the surficial aquifer may result in worker exposure to vapor and particulate emissions.	Complies with RCRA-40 CFR Part 264, and Executive Order 11990; Drinking Water Standards; Groundwater Protection Strategy; and Fish and Wildlife Coordination Act.	Improvement to the biological environment will be rapid and future use of the aquifer can be restored.
Overall Ranking High	Potential threat from contaminated groundwater is mitigated.	Periodic monitoring of residential wells will continue during clean-up.	Extraction of groundwater from the surficial and bedrock aquifer may be difficult. The time required to extract groundwater is difficult to predict.	Barricading trenches should provide for worker safety during groundwater extraction.	Complies with the intent of SARA to provide a permanent or significant reduction in the volume, toxicity and mobility of contaminants.	Potential threat from contaminated groundwater migration is mitigated.
Capital Costs $799,000	This treatment process will result in a permanent and significant reduction in volume and toxicity of contaminants.		Groundwater pumping and process equipment is subject to routine mechanical breadowns, maintenance and repairs.	Increased risk associated with potential for spills during containerization and transport.		Reduced exposure potential from contaminated groundwater to the local population.
Present Value of O & M Costs $963,000						
Total Present Worth Costs $1,762,000						

TABLE V-14

MOM-GW4A - OFF-SITE TREATMENT EVALUATION

Remedial Alternative	Reduction of Toxicity Mobility or Volume	Reliability	Implementability Constructability	Short-Term Effectiveness	Compliance with ARARs	Long-Term Effectiveness
MOM-GW4A Removal and Off-site Treatment at an TSD Facility. Overall Ranking Medium Capital Costs $258,700 Present Value of O & M Costs $3,307,600 Total Present Worth Costs $3,566,300	High Potential threat from contaminated groundwater is mitigated. Removal and treatment provides a significant and permanent reduction in the volume, toxicity and mobility of contaminants.	High Unit processes and similar systems have proven successful at other Superfund sites. Periodic monitoring of residential wells will continue during clean-up.	Low/Medium Extraction of groundwater from the surficial and bedrock aquifer may be difficult. Groundwater pumping equipment is subject to routine mechanical breakdowns, maintenance and repairs. Increased risk associated with potential spills during transport of contaminated groundwater. Locating a TSD facility may be a problem.	Medium Excavation of trenches for collection of groundwater in the surficial aquifer may result in worker exposure to vapor and particulate emissions. Barricading trenches should provide for worker safety during groundwater extraction. Increased risk associated with potential spills during transport of contaminated groundwater.	Medium Complies with RCRA-40 CFR Part 264 and Executive Order 11990; Drinking Water Standards; Groundwater Protection Strategy; and Fish and Wildlife Coordination Act. Although this alternative provides a permanent and significant reduction in the volume, toxicity and mobility of contaminants, the transport of hazardous materials off site makes this a least favored alternative.	High Improvement to the biological environment will be rapid and future use of the aquifer can be restored. Potential threat from contaminated groundwater migration is mitigated. Reduced exposure potential from contaminated groundwater to local population.

VI. SELECTION OF REMEDY

A. Description of the Selected Remedy

The remedial action selected for implementation at the Keefe Environmental Services Superfund Site is consistent with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Contingency Plan (NCP) 40 CFR Part 300 et seq., 47 Federal Register 31180 (July 16, 1982) as amended. The selected remedial action is a comprehensive approach for site remediation which includes a source control and management of migration component. A comprehensive approach is necessary in order to achieve the response objectives established for site remediation and governing legal requirements.

1. Scope of the Selected Remedy

The source control component of the selected remedy is in-situ treatment utilizing vacuum extraction as described for Alternative SC-3A in the Detailed Evaluation of Alternatives (Section V.E.).

Vacuum extraction involves the removal of unsaturated soil source contamination by developing a vacuum within the soil matrix in order to induce air and contaminant flow through the pore structure. As soil gas migrates through the pore spaces, mass transfer between the trapped residual unsaturated contamination and the air occurs, releasing the contamination. This facilitates contaminate removal without soil excavation. Reports indicate significant quantities of contamination can be removed in this manner in a relatively short time frame. For example, over 250 pounds per day (18.8 gallon per day) of Carbon Tetrachloride (CCL_4) was removed from a clay soil matrix using this technique at a recent tank farm spill.

Vacuum extraction is classified as an active vapor collection system. It consists of vapor extraction wells, vapor collection headers, vacuum blowers or pumps and vapor collection (condensers) and/or vapor treatment (carbon adsorption) equipment. The technology is not considered extremely innovative as a few case histories are available.

Four areas at the KES Site may be subject to the vacuum extraction system. The depth to ground water in these areas varies from 7-10 feet in the central portion of the Site to 3-5 feet in the southwestern corner of the Site. A maximum area of 150,000 square feet is estimated for vacuum extraction. This area will be confirmed through additional soil sampling during the pilot plant study stage of remedial design. In the areas where the water table is high (i.e., the southwestern portion of the Site), the vacuum extraction system may be more difficult to operate due to the increased moisture that will undoubtedly be removed during extraction. However, if ground water extraction and treatment systems are installed, the ground water depth will drop allowing for improved efficiencies. Although the length of time for treatment is dependent upon extraction efficiency and actual soil areas to be treated, both of which will be further defined during the pilot plant study stage, five years for treatment has been conservatively estimated for costing purposes.

This alternative is expected to require relatively little time to implement. Several vacuum wells can be completed by a single crew in a day and collection piping and mechanical equipment can be installed concurrently. No soil excavation is required. Vapor extraction can be started upon completion of the system and immediate removal of contaminants realized.

The extracted gas will contain high levels of volatile organic compounds (VOCs) and moisture. Moisture will be removed by a sloping header followed by a water cooled condenser to remove any remaining moisture and some VOCs. Water for the condenser will be supplied by the ground water treatment system recommended for the management of migration alternative. Moisture collected in the condenser will be returned to the ground water treatment system for treatment. The system provides a high degree of flexibility. Valve adjustments enable the operator to maximize (or minimize) flow from an area. Flow adjustments are made initially so that most of the extracted flow is from the area of highest contamination. As concentrations are found to decrease, adjustments can be made so that most of the flow is directed toward areas having the highest contaminant levels.

Capital costs include costs for extraction wells, vapor collection header piping, blowers and associated valves, electrical fixtures, etc., condensers and carbon canisters. Additional costs include provisions for pilot studies and sampling equipment (bottles, coolers and car rental). These costs are presented in Table VI-1. Operation and maintence costs include costs for electricity, small material costs such as tools, lubrication and belts, manpower costs and other annual costs such as insurance, security and administration. Additional soil and vapor sampling are included in this estimate to further define existing soil contamination and to provide documentation for system performance. Table VI-2 illustrates these costs and the total cost for this alternative. The management of migration component of the selected remedy is MOM-GW3B consisting of air stripping, filtration, carbon adsorption and discharge back to ground water.

TABLE VI-1

CAPITAL COSTS FOR SOURCE CONTROL*

Item	Quantity	Unit	Unit Cost	Total Cost
Vapor extraction well (drilling, stone, piping, etc.), in place	200	Vert. Ft.	$ 115	$ 23,000
Well connection lateral (10 ft. piping valve, excavation, fittings, etc.), in place	20	Each	2,250	45,000
Vapor collection header {piping, excavation, fittings, etc.}, in place	1,000	Linear.Ft.	150	150,000
Blower facility {blowers(s), safety devices, valves, foundation, piping, fencing, electrical components and service connection}, in place	1	Lump Sum	150,000	150,000
Mobile Treatment Facility	1	Each	300,000	300,000
Sampling Equipment	1	Each	7,500	7,500
Electrical Utilities				30,400
			Subtotal Cost	705,900
Engineering & Design(15%)				105,885
Contractor Profit (10%)				70,590
Contingency (15%)				105,885
Pilot Studies				150,000
				$1,138,260

*SOURCE: SCS Engineers 1980 (updated to 1/88)

TABLE VI-2

OPERATION AND MAINTENANCE COSTS FOR SOURCE CONTROL

Item	Quantity	Annual Unit Cost $
Maintenance	Lump Sum	$ 11,200
Power	Lump Sum	43,700
Sampling Labor Costs	640 Manhours @$45/manhour	28,000
Personnel	14,000 Manhours @45/manhour	630,000
Analytical Laboratory Costs	200 Soil and Vapor samples @$500/sample	100,000
On-Site Analytical Capabilities (Vapor Sampling Only)	640 Manhours @$45/manhour	28,800
		$ 842,500

Five-year Present Worth of O&M Costs: $3,193,900

Total Cost: $1,138,270 + $3,193,900 = $4,332,170

*Quantities are per year allowing for quarterly sampling of site

This alternative entails extracting contaminated ground water from both the overburden and bedrock aquifers, treating it on-site using air stripping, filtration and carbon adsorption and discharging it to the ground water. Air stripping is preceded by coagulation/precipitation for metals removal in a clarifier and followed by neutralization.

The metals analyses seem to indicate that no metals are present above water quality criteria; however, metals removal is necessary to remove iron from the ground water. Although no iron analysis data is available for the ground water at this Site, ground water containing VOCs typically contains large quantities of iron due to leaching out from the soil. This iron must be removed before the water enters the air stripper, or else the iron will oxidize and precipitate out onto the tower packing causing operational problems. A coagulation/precipitation system will typically remove metals down to a few parts per billion.

Ground water from the bedrock will be extracted using the existing deep (115 feet) ground water extraction well CW-3C and CW-5C. The estimated pumping rate for CW-3C and CW-5C will be 2-5 gallons per minute (gpm). In addition, two , two-foot wide collection trenches and overburden well CW5A will be used to extract water from the overburden aquifer. Combined length of the two-foot wide trenches is 2300 feet. The estimated pumping rate for the removal of ground water from the trenches and well CW-5A is 2 gpm. The combined rate of ground water removed from the wells and the trenches is 4 to 7 gpm. Based on the volume of the aquifer, the pumping rate of 4 gpm represents a volume treated of 0.1 pore volumes per year. The exact location and sizing of the ground water extraction system will be accomplished during the design phase.

The coagulation/precipitation operation is carried out in a reactor/clarifier. This single unit combines chemical mixing, flocculation and settling. The unit and all chemical feed and storage systems would be located in a building to prevent freezing during winter operation. Chemical coagulation with alkali reduces the concentration of metals to the 0.01 to 0.5 ppm range depending on the metal and its oxidation state.

The metal hydroxide sludge from the bottom of the reactor/clarifier is continuously pumped to a sludge thickener/holding tank where the sludge is temporarily stored and thickened. The thickened sludge is then pumped to 55-gallon drums. Approximately one, 55-gallon drum of sludge would be produced per day. This estimate will be confirmed or modified by the treatability study. The sludge will be classified as a Resource Conservation and Recovery Act (RCRA) hazardous waste and will require disposal at a licensed hazardous waste treatment, storage and disposal facility (TSD).

Air stripping is used to remove toxic volatile organics from the ground water. Air stripping is relatively inexpensive yet an effective means of removing contaminants from the ground water. The air stripping units consist of packed towers filled with plastic packing media such as polypropylene rings. Air is blown countercurrent to the flow of liquids. The packing height is estimated to be approximately 12 feet for removal of VOCs up to 90 percent. This process is very effective in removing volatile organic compounds which are the major concern at the KES Site.

The air stream exiting the air stripping towers contains volatile organic compounds and must be treated prior to discharge to the atmosphere. The processes available for removing volatile organic contaminants from the air stream are vapor phase carbon or flaring of the air stream. Vapor phase carbon adsorption would be the most economical, based on the expected air flow and composition of organics in the air. The tower exit air is dehumidified and passed through vapor phase activated carbon beds where the volatile organic compounds are selectively adsorbed and thus removed from the air stream.

The treated ground water from the air stripping tower discharges to a neutralization tank, where the pH is lowered to between 6 and 8. A pH of 7 is neutral being neither acidic or alkaline.

The effluent from the neutralization tank is pumped through a pressure filter to remove suspended solids which may clog the activated carbon columns. The filter media consists of finely-graded layers of gravel and sand. A backwash water system is used to wash the filter medial periodically. The contaminated backwash water is recycled to the reactor/clarifier for treatment.

Granular activated carbon is used in the final treatment process to adsorb the remaining toxic organic compounds from the ground water. Activated carbon is effective in adsorbing a wide range of organic compounds. Data compiled by Shuckrow et al, show that activated carbon can achieve high removal efficiencies of 80 to 100 percent for many of the 126 compounds on EPA's priority pollutant list. The combination of chemical coagulation and activated carbon should reduce organic and metal concentrations to below the National Water Quality Criteria. Pilot testing will be required to confirm these removal efficiencies.

Treated ground water from the carbon contractors will be pumped to recharge beds located along the western border of the Site next to the wetlands. The recharge beds allow the treated ground water to be discharged uniformly to the ground and ultimately into the ground water aquifer and wetland. Other discharge alternatives such as direct discharge to the wetland and ground water discharge along the eastern border of the Site were also evaluated. A ground water discharge along the eastern border of the Site was eliminated because of the very tight soils on-site and the quantity of treated ground water which will be discharged. The soils covering most of the Site are a weathered till which is not conducive to ground water movement. Because of this tight soil condition, a trench system for collecting overburden ground water is proposed rather than extraction wells or a series of well points. Once the collection trenches are installed, very little area will remain to construct recharge trenches. Also, the collection trenches will collect only about two gallons per minute of ground water from the sand and gravel deposits. The recharge trenches will have to be sized for a combined flow of 4-7 gallons per minute. The sizing of a recharge trench system to handle this larger flow is possible along the western border of the Site where the soils are not as tight and the depth to ground water very shallow. Treated ground water discharged to recharge trenches along the western border of the Site will almost immediately enter the natural ground water system and ultimately the wetland. A direct discharge to the wetland was also evaluated. Since the treated ground water will meet drinking water quality, a direct discharge to the wetland will not result in adverse impacts. The added flow to the wetland will also serve to maintain the wetland during periods of dry weather. The recharge trench system was chosen over a direct discharge because it will provide a more uniform distribution of flow and eliminate potential problems with erosion or freezing conditions in cold weather.

Ground water extraction and treatment will proceed for five years or until cleanup goals, as presented in Table VI-5, have been achieved, which ever is sooner. If, after five years the cleanup goals have not been achieved, an evaluation will be performed to determine if the cleanup goals are still valid and technically attainable. Ground water treatment will cease upon achieving cleanup goals in the influent to the treatment facility and all monitoring wells. Upon ceasing ground water treatment, the monitoring wells will continue to be sampled to insure that cleanup goals have been achieved.

Capital costs include costs for extraction wells, vapor collection header piping, blowers and associated valves, electrical fixtures, etc., condensers and carbon canisters. (See Table VI-3). Additional costs include provisions for pilot studies and sampling equipment (bottles, coolers and car rental). Operation and maintenance costs include costs for electricity, small material costs such as tools, lubrication and belts, manpower costs and other annual costs such as insurance, security and administration. Additional soil and vapor sampling will be included in this estimate to further define existing soils

TABLE VI-3

CAPITAL COSTS FOR MANAGEMENT OF MIGRATION

	COST
Collection System	$ 70,000
Coagulation/Precipitation	42,000
Air Stripping	29,000
Pumping	42,000
Sludge Thickener	3,500
Building	27,000
Electrical	17,000
Sitework	25,000
Discharge System	19,000
Dual Media Filtration	47,000
Carbon Adsorption	133,500
Vapor Phase Carbon	64,000
TOTAL	$ 519,000
Pilot Treatability Study	$ 150,000
Engineering Administration (10%)	52,000
Contingencies (15%)	78,000
TOTAL PROJECTED COST	$ 799,000

contamination and to provide documentation for system performance. Table VI-4 illustrates these costs.

2. Performance Goals of the Selected Remedy

Ground water and soil cleanup levels for the Keefe Environmental Services Site were developed on the basis of the Base Line Risk Assessment, Chapter 8 of the Supplemental Remedial Investigation, and the evaluation of the No-Action Alternative in the Feasibility Study. The base line risk assessment determined the present and future potential risks to public health and the environment associated with the exposure to the contaminants from the Keefe Environmental Services Site in the absence of any remedial action. The no action evaluation in the Feasibility Study established goals for cleanup. Since the soil contamination of the Keefe Environmental Services Site is the source of ground water contamination, cleanup goals were set for both ground water and soils. The point at which the ground water cleanup goals are attained was chosen as anywhere beneath the Site.

Of the eighteen compounds detected in ground water and/or soils at the KES Site, five compounds were selected as human health indicator compounds based on their potential carcinogenic effects. The indicator compounds selected for the KES Site are Benzene, Tetrachloroethylene, Trichlorethylene, 1-2 Dichloroethane and 1-1 Dichloroethylene. The National Primary Drinking Water Standard/Maximum Contaminant Level (MCL) for Benzene, Trichloroethylene and 1-2 Dichloroethylene is 5 parts per billion while the MCL for 1-1 Dichloroethylene is 7 parts per billion. An MCL for Tetrachloroethylene has not been developed; however, it has similar chemical, physical and toxicological properties as Trichloroethylene and therefore the same standard of 5 parts per billion will be used. The cleanup goals for ground water are set at these levels. The cumulative risk associated with these proposed cleanup goals falls within EPA's acceptable risk range of 10^{-4} to 10^{-7} and are presented in Table VI-5. Assuming that the concentration of these indicator compounds will remain proportionally the same during treatment, in reducing the level of Benzene down to its MCL of 5 parts per billion (ppb), the concentrations of Tetrachloroethylene, Trichloroethylene and 1-1 Dichlorethylene could be reduced to 2ppb each and for 1-2 Dichlorethane may be reduced to as low as 0.3ppb. At these levels, the incremental lifetime cancer risk from exposure to ground water containing this chemical mixture could be as low as 1.4×10^{-5}. Actual cleanup levels attained should result in a cancer risk ranging between 1.4 and 5.7×10^{-5}.

Estimated soil source contaminant goals were based on the allowable ground water concentration. The estimated adsorption coefficient, which is the ratio of the concentration of the

TABLE VI-4

OPERATION AND MAINTENANCE COSTS FOR MANAGEMENT OF MIGRATION

	Annual Costs
Personnel	$ 68,320
Maintenance	33,600
Power	3,360
Chemicals	28,000
Water	1,120
Sample and Analysis	89,600
Sludge Disposal	30,240
TOTAL	$ 254,240

5-Year Present Worth Cost
$254,240 x 3.791 = $963,800

30-Year Present Worth Cost
$254,240 x 9.427 = $2,396,700

The total estimated cost for this option is the sum of the capital costs and the operation and maintenance costs.

This sum is:

5-Year: $799,000 + $ 963,800 = $1,762,800
30-Year: $799,000 + $2,396,700 = $3,195,700

TABLE VI-5

GROUND WATER CLEANUP LEVEL RISKS

Compound	Group Classification*	Cleanup Goal (MCLs) (ppb)	Cancer Risk
Benzene	A	5	4.2×10^{-6}
Tetrachloroethylene	B	5	7.1×10^{-6}
Trichloroethylene	B	5	1.8×10^{-6}
1,2-Dichloroethane	B	5	13.2×10^{-6}
1,1-Dichloroethylene	C	7	30.5×10^{-6}
		Group A & B Risk	2.6×10^{-5}
		Group A,B & C Risk	5.7×10^{-5}

*Reference: Superfund Public Health Evaluation Manual
Office of Emergency and Remedial Response EPA/540/1-86/060

EPA Category	Description of Group	Description of Evidence
Group A	Human Carcinogen	Sufficient evidence from epidemiologic studies to support a causal association between exposure and cancer
Group B1	Probable Human Carcinogen	Limited evidence of carcinogenicity in humans from epidemiologic studies
Group B2	Probable Human Carcinogen	Sufficient evidence of carcinogenicity in animals, inadequate evidence of carcinogenicity in humans
Group C	Possible Human Carcinogen	Limited evidence of carcinogenicity in animals
Group D	Not Classified	Inadequate evidence of carcinogenicity in animals
Group E	No Evidence of Carcinogenicity in Humans	No evidence for carcinogenicity in at least two adequate animal tests or in both epidemiologic and animal studies

Source: Federal Register, Vol. 49, No. 227 pp. 46294-46301 soil to the concentration of the water, was used to calculate the corresponding level of soil contamination.

The distribution coefficient, K_d, was calculated for each compound using the following relationship:

$$K_d = f_{oc} \times K_{oc}$$

where

K_d = the distribution coefficient describing the distribution of a chemical between a soil and water at equilibrium, ml/g.

f_{oc} = fraction of organic content present on the soil.

K_{oc} = the organic carbon partition coefficient, ml/g.

Typically, glacial soils contain small amounts of organic carbon, roughly 5 percent and calculating a K_d based only upon this parameter would yield low K_d values since clay content and iron oxide content of soils have been shown to significantly increase the adsorptive capacity of soils. The soils at the KES Site have large amounts of clay material and therefore the K_d should reflect this. Since there have been no isotherm tests performed to determine this parameter, the K_d was calculated as the product of the adjusted K_{oc} for the individual compound and 0.05 (fraction of organic carbon). This means that it was assumed that approximately 5 percent of the soil solids would contribute to the adsorption of contamination upon the soil solids surface. The calculated value for K_d at the KES Site for each compound and the estimated allowable range of soil contamination concentrations are shown in Table VI-6.

B. Statutory Determinations

Section 121(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) requires EPA to select appropriate remedial actions determined to be necessary to be carried out under Section 104 or secured under Section 106 which are in accordance with Section 121 and, to the extent practicable, the National Contingency Plan (NCP), and which provides for cost-effective response. The selected remedy presented herein is consistent with the requirements of CERCLA and to the extent practicable the NCP.

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. Section 121(b) of CERCLA requires that remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment. The statute also requires EPA to select a remedial action that is protective of human health and the environment, that is cost-effective and that utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The Agency may select an alternative remedial action meeting the objectives whether or not such action has been achieved in practice at any other facility or site that has similar characteristics.

Further, Section 121(d) of CERCLA provides that EPA's remedial action, when complete, must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws.

1. Protectiveness

a. Source Control

EPA has determined that the proposed cleanup goals for soils, as presented in Table VI-6, are protective of human health and the environment based upon assumptions presented in Section VI.A.2. of this document and Chapter 4 of the Feasibility Study.

These cleanup goals for soils are associated with an excess cancer risk of approximately 5.7×10^{-5} through ingestion of ground water. EPA has reasonably assumed in its exposure analysis that the Keefe Environmental Services Site and immediately adjacent areas could be developed in the future. Any development in this area would rely on ground water as a potable water source.

Soil remediation to the proposed cleanup goals is necessary to attain a ground water cleanup level that is protective of public health and the environment within a reasonable time frame.

b. Management of Migration

The Agency's decision to restore the ground water at the Site to a cancer risk level of 5.7×10^{-5} was based on several factors. The Agency considered its Ground Water Protection Strategy (GWPS) (Office of Ground Water Protection, August, 1984) which provides guidance concerning how different ground waters throughout the country should be classified and to what extent cleaning up a particular class of ground water is appropriate. EPA also considered the Agency's draft Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites (October 1986). This guidance directs the Agency to consider a 10^{-4}

TABLE VI-6

SOIL CLEANUP GOALS

Compound	Koc[1]	Kd[2]	Soil Cleanup Goals (ppb)
Benzene	83	4.15	20.8
Tetrachloroethylene	364	18.2	91.0
Trichloroethylene	126	6.3	31.5
1,2-Dichloroethane	14	0.7	3.5
1,1-Dichloroethylene	65	3.25	22.8

[1] Koc is the organic carbon partition coefficient.
Ref: Superfund Public Health Evaluation Manual
(Draft) OERR, OWSER Dec. 1985

[2] Kd is the soil/water adsorption coefficient calculated by:
Kd = Koc x foc where foc is the fraction of organic carbon present in the soil (0.05)

to 10^{-7} range of risk levels in selecting the appropriate risk level for the ground water at the Site.

The policy under the GWPS establishes ground water protection goals based on "the highest beneficial uses to which ground water having significant water resources value can presently or potentially be put." Guidelines for protection of aquifers are differentially based, relative to characteristics of vulnerability, use and value. Under the classification scheme, the ground water at the KES Site is Class II ground water. This ground water is considered to be a current drinking water source since ground water is used for drinking water within a two-mile radius of the Site (the classification review area).

EPA believes that active restoration of the ground water is appropriate for the Site. Presently, the residents in the area obtain their ground water from either the overburden aquifer or bedrock aquifer systems. Contamination in the bedrock aquifer has been detected at low levels beyond the Site boundaries. Although not presently impacting existing residential wells, continued migration of contaminants and/or increased development resulting in increased ground water demand could result in impacts to down gradient wells in the future.

Finally, it is reasonable to assume that development could occur on or near the Site following remediation. As mentioned previously, source soils will be remediated to levels that are protective of human health and the environment. Under these circumstances, ground water obtained from aquifers, directly beneath the Site, could be used for drinking water purposes.

Consistent with the draft Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites and EPA's Superfund Public Health Evaluation Manual, EPA evaluated a risk range of 10^{-4} to 10^{-7} individual lifetime cancer risks for carcinogens in selecting a risk level for ground water. In selecting the appropriate risk level for the Site and the rate of restoration, EPA considered the following major factors:

1. Site and ground water characteristics.

2. Cost, reliability, speed and technical feasibility of ground water response actions.

3. Anticipated future need for the ground water.

4. Potential for spreading of the contaminant plume.

5. Effectiveness and reliability of institutional controls.

EPA applied drinking water standards (MCLs) in establishing the appropriate cleanup level for the Site. As the legally enforceable standards under the Safe Drinking Water Act, MCLs determine the level of water quality that is acceptable for consumption by people who obtain their drinking water from public water supplies. Cleanup target levels of 5 ppb each for benzene, trichloroethylene, and 1,2-Dichloroethane and a cleanup level of 7 ppb for 1,1-Dichloroethylene are equivalent to the federal requirements set under the Safe Drinking Water Act. A standard for Tetrachloroethylene has not been developed, however, it has similar chemical, physical and toxicological properties as Trichloroethylene and therefore the same cleanup level of 5 ppb will be used. An incremental lifetime cancer risk of 5.7×10^{-5} associated with exposure to this chemical matrix in water is considered by EPA to be adequately protective of public health. EPA anticipates that the area surrounding the Site will continue to be developed, thus increasing the future need of this aquifer.

EPA rejects 10^{-6} and 10^{-7} risk levels, due to the technical and economic infeasibility of remediating ground water to a level more protective than the incremental lifetime cancer risk of 5.7×10^{-5}.

2. Consistency with Other Environmental Laws

Federal environmental laws which are applicable or relevant and appropriate to the recommended source control and management of migration alternatives at the Keefe Environmental Services Site are:

- Resource Conservation and Recovery Act (RCRA)
- Clean Water Act (CWA)
- Safe Drinking Water Act (SDWA)
- Executive Order 11988 (Floodplain Management)
- Executive Order 11990 (Protection of Wetlands)
- Fish and Wildlife Coordination Act
- Clean Air Act (CAA)
- Occupational Health and Safety Act (OHSA)
- State of New Hampshire ARARs are set forth in Appendix D

As specified in the Detailed Analysis of Alternatives Section and as presented in Table VI-7 and Appendix D, the recommended alternative is expected to comply with the above laws. The State of New Hampshire has not identified any ARAR more stringent than those contained in the above Federal ARARs.

3. Cost Effectiveness and Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

On-site soils are acting as a continuous source of volatile organic contamination for the ground water. Ground water in both the overburden and bedrock aquifer systems is primarily contaminated with VOCs that are carcinogens or suspected carcinogens. Contaminants in the overburden and bedrock aquifers are migrating away from the Site.

On-site vacuum extraction is an innovative treatment technology that will provide a permanent solution to the organic contamination at the Site. Treatment of the contaminated soils in the unsaturated zone to proposed soil cleanup goals will reduce the risks posed to human health from ingestion of ground water by significantly reducing the volume and toxicity of the contaminants. The soil treatment will also reduce the time for the cleanup of ground water.

Table VI-8 presents a cost comparison of each source control alternative.

Although Alternative SC-1 (No Action) and SC-2 (Capping) are less expensive than Vacuum Extraction, neither alternative provides for a permanent and significant reduction of volume, toxicity and mobility of the contaminants. Vacuum Extraction is 33 percent less costly than SC-4A (Thermal Stripping) and 49 percent less costly than SC-4B (Soil Washing) while providing the same level of treatment. In comparison to SC-7 (Off-Site Disposal), Vacuum Extraction is 77 percent less expensive. In addition, Off-Site Disposal does not comply with Section 121(b) of CERCLA as amended in that off-site transport and disposal of hazardous substances without treatment should be the least favored alternative. Cleanup of the contaminated ground water will be accomplished using the best demonstrated available technology. The final design of the unit processes will be determined following completion of the treatability studies scheduled to be conducted during remedial design.

Treatment of the ground water will permanently and significantly reduce the volume, toxicity and mobility of the volatile organics present. Restoration of the aquifer to a 5.7×10^{-5} risk level will permit the ground water on-site to be used for drinking water purposes in the future. Furthermore, cleanup of the ground water to the target level will eliminate the threat posed to public health and the environment from the future extent of contaminant migration in ground water.

The selected ground water remediation alternative, on-site air stripping followed by activated carbon adsorption, is more

TABLE VI-7a
FEDERAL ARARs FOR ALTERNATIVE SC-3

FEDERAL REQUIREMENTS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARs
1. Hazardous Waste Regulations (RCRA Subtitle C, 40 CFR Part 264)	• These regulations are relevant and appropriate because they supply standards for responding to releases of hazardous wastes from units analogous to source areas at the site.	• This alternative is expected to achieve a clean closure. However, post-closure ground water monitoring may be necessary, and if so, will comply with these requirements.
• Closure and Post-Closure (264.110 - 264.120) (Subpart G)^2	• This regulation details the specific requirements for closure and post-closure of hazardous waste facilities.	• Remedial alternative may require temporary storage of contaminated separator water. Design of temporary storage facilities will comply with these requirements.
• Tanks (264.190 - 264.198) (Subpart J)^2	• This regulation outlines design requirements for tank systems, for storing hazardous waste.	
2. Clean Air Act (42 U.S.C. 7401)		
• National Ambient Air Quality Standards (NAAQS) (40 CFR, Part 52.1520 - 52.1531)	• Refer to State Implementation Plan in Appendix D.	• Refer to State Implementation Plan in Appendix D.
3. OSHA Requirements (29 CFR, Parts, 1910, 1926 and 1904)	• Part 1910 specifies the 8-hour time weighted average concentration for various organic compounds.	• Proper respiratory gear will be worn if it is not possible to maintain the work atmospheres below these concentrations.
	• Part 1926 specifies the type of safety equipment and procedures to be followed during site remediation.	• All appropriate safety equipment will be on-site and procedures will be followed during ground water monitoring.

NOTES: ^{1}Applicable - ^{2}Relevant and Appropriate - ^{3}To be considered

TABLE VI-7a (CONTINUED)

FEDERAL ARARs FOR ALTERNATIVE SC-3

FEDERAL REQUIREMENTS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARs
	• Part 1904 outlines the record-keeping and reporting requirements for an employer under OSHA.	• These regulations are applicable to contractors involved in in site work.
4. Executive Orders 11988 (Floodplain Management) and 11990 (Protection of Wetland)[2]	• Floodplain Management states that federal agencies shall reduce the risk of flood loss, minimize the impacts of flood on human safety, health and welfare and restore and preserve the natural and beneficial values served by floodplains. Protection of wetlands states that federal agencies shall minimize the destruction, loss or degradation of wetlands and preserve and enhance the natural and beneficial values of wetlands.	• Floodplains and wetlands along the site boundary are not expected to be disrupted due to the remedial action. Control measures will be taken to mitigate potential impacts associated with erosion, sedimentation and resuspension of sediments.
5. Fish and Wildlife Coordination Act (16 USC 661)[3]	• This regulation requires that any federal agency that proposes to modify a body of water must consult with the U. S. Fish & Wildlife Service.	• The U.S. Fish & Wildlife Service and state agencies have been consulted regarding this project.

NOTES: [1] Applicable - [2] Relevant - [3] To be considered

TABLE VI-7b

FEDERAL ARARs FOR ALTERNATIVE MOM-GW3B

FEDERAL REQUIREMENTS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARs
1. Hazardous Waste Regulations (RCRA Subtitle C, 40 CFR Part 264)	• These regulations are relevant and appropriate because they supply standards for responding to releases of hazardous wastes from units analogous to source areas at the site.	• A ground water monitoring program will be installed to ensure cleanup goals are attained in compliance with Part 264 requirements.
• Ground Water Protection (264.90 - 264.109) (Subpart F) and Ground Water Monitoring (264.90 - 264.94)^2	• These regulations detail the requirements for a ground water monitoring program and set concentration limits for hazardous constituents.	
• Tanks (264.190 - 264.198) (Supart J)^1	• This regulation outlines design requirements for tank systems for storing hazardous waste.	• The Remedial Alternative will require design of temporary storage of chemicals utilized in the ground water treatment facility and of contaminated ground water in equalization tanks at the beginning of the treatment process which will comply with these regulations.
2. Safe Drinking Water Act Maximum Contaminant Levels (MCLs) (40 CFR 141.11 - 141.16)^2	• Identifies cleanup levels of specific chemicals for public drinking water supplies based on human health effects and levels achievable by technology. • These regulations are relevant and appropriate because the ground water at the site may be used as a potential drinking water source.	• RI activities identified the presence of chemicals in the ground water for which MCLs are listed. These were incorporated into the site risk assessment. This alternative provides treatment to levels equal to or less than MCLs.

NOTES: ^{1} Applicable - ^{2} Relevant - ^{3} To be considered

TABLE 7b (CONTINUED)

FEDERAL ARARs FOR ALTERNATIVE MOM-GW38

	FEDERAL REQUIREMENTS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARs
3.	Safe Drinking Water Act Maximum Contaminant Level Goals (MCLGs) (40 CFR) 141.50 - 141.51)[2]	• Identifies cleanup level goals of specific chemicals for public drinking water supplies based on human health effects	• RI activities identified the presence of chemicals in the ground water for which MCLGs are listed. These were incorporated into the site risk assessment.
		• MCLGs, formerly known as RMCLs, are not ARARs for this site because EPA has determined that MCLs are fully protective of human health and the environment. Although an MCL for one of the indicator compounds, tetrachloroethylene, has not been developed, it has similar chemical, physical and toxicological properties as Trichloroethylene for which an MCL of 5 ppb has been developed. Therefore, the same MCL will be used for Tetrachloroethylene.	
4.	Health Advisories, EPA Office of Drinking Water[3]	• Identifies toxicology information regarding certain chemicals which is used for the site risk assessment.	• RI activities identified the presence of chemicals for which health advisories are listed. These were incorporated into the site risk assessment.

NOTES: [1] Applicable - [2] Relevant - [3] To be considered

TABLE 7b (CONTINUED)

FEDERAL ARARs FOR ALTERNATIVE MOM-GW3B

FEDERAL REQUIREMENTS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARs
5. Clean Water Act (Section 304) Federal Water Quality Criteria (FWQC)[2]	• Title III of the CWA sets forth standards for direct discharge of pollutants to the waters of the United States. These standards are not applicable because the proposed facility will not have a direct discharge. They are, however, relevant and appropriate because the effluent from the ground water treatment facility will combine with the existing ground water regime which eventually discharges to the wetland adjoining the site.	• The proposed ground water treatment facility will meet or exceed all established ambient Water Quality Criteria.
6. Underground Injection Control Regulations (40 CFR 144, 145, 146 and 147)[3]	• This regulation outlines injection permit requirements. These regulations would be relevant and appropriate only if seepage pits or equivalent are used as they are analogous to underground injection wells.	• If underground seepage pits or equivalent are utilized, then this Regulation will be complied with.
7. Clean Water Act (Section 303)		
• State Water Quality Standards	• See State ARARs in Appendix D.	• See State ARARs in Appendix D.

NOTES: [1] Applicable - [2] Relevant - [3] To be considered

TABLE 7b (CONTINUED)

FEDERAL ARARs FOR ALTERNATIVE MOM-GW38

FEDERAL REQUIREMENTS	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARARs
8. OSHA Requirements (29 CFR, Parts 1910, 1926 and 1904)[1]	• Part 1910 specifies the 8-hour time weighted average concentration for various organic compounds.	• Proper respiratory equipment will be worn if it is not possible to maintain the work atmospheres below these concentrations.
	• Part 1926 specifies the type of safety equipment and procedures to be followed during site remediation.	• All appropriate safety equipment will be on-site and procedures will be followed during ground water monitoring.
	• Part 1904 outlines the recordkeeping and reporting requirements for an employer under OSHA.	• These regulations are applicable to contractors involved in site work.
9. EPA's Ground Water Protection Strategy[3]	• Defines protection policy for ground water based on value and vulnerability.	• The aquifer in the vicinity of the site will be protected pursuant to this strategy.

NOTES: [1] Applicable - [2] Relevant - [3] To be considered

TABLE VI-8

SOURCE CONTROL COST COMPARISON

Alternative	Capital Cost	Annual O&M Cost	Treatment Period (yrs.)	Total Present Worth Costs
SC-1 No Action	$ 178,200	$ 41,900	30	$ 573,000
SC-2 Capping	2,182,400	95,700	30	3,084,900
SC-3A Vacuum Extraction	1,138,300	842,500	5	4,332,200
SC-4A Lt. Thermal Stripping	3,905,000	1,505,550	2	6,519,000
SC-4B Soil Washing	6,705,000	991,200	2	8,425,700
SC-7 Off-Site Disposal	18,464,000	11,000	2	18,483,300

Present Worth Factors
2 Years - 1.736
5 Years - 3,791
30 Years - 9,427

costly than air stripping alone. However, air stripping alone will not attain the target cleanup goals for drinking water quality. The alternative that requires shipment off-site of contaminated ground water for treatment is much more costly, does not provide greater public health protection and is of questionable implementability.

In contrast, the no-action alternative is not an appropriate remedy. First, such a remedy would be unreliable and not effective in terms of protecting human health considering future uses of the Site. Second, such a remedy does not comply with applicable or relevant and appropriate requirements. Finally, the no-action alternative does not meet the strong statutory preference for remedies that employ treatment to reduce toxicity, volume or mobility of contaminants.

Based on information contained in the Administrative Record, EPA has determined that the selected remedial action is consistent with Section 121 of CERCLA and utilizes treatment which permanently and significantly reduces the volume, toxicity and mobility of the hazardous substances at the Site. Further, the remedial action is protective of human health and the environment, cost-effective and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

C. State Acceptance

The State of New Hampshire Department of Environmental Services (NHDES) formerly the New Hampshire Water Supply and Pollution Control Commission (NHWS&PCC) has reviewed the various alternatives and has indicated its support for the selected remedy.

D. Community Acceptance

During the public comment period for the Draft Feasibility Study and Proposed Plan, a number of comments and concerns were raised by the public. These comments and EPA's responses are presented in Appendix A - Keefe Environmental Services Responsiveness Summary.

E. Conclusion

Based on information available in the Administrative Record and the evaluation of the alternatives against the statutory requirements of CERCLA, the NCP, and the criteria contained in OSWER Directive 9355.0-21, EPA has concluded that the selected remedy is protective of human health, attains all applicable or relevant and appropriate requirements and is cost-effective. This remedy also satisfies CERCLA preference for remedies which employ treatment as their principal element to reduce the volume, toxicity or mobility of hazardous substances at the

Site.

Although this remedy will require measures to control possible risks related to its construction and operation, the Agency's analysis indicates that all of these risks can be satisfactorily controlled. Additionally, any short-term risks appear heavily outweighed by the long-term effectiveness and permanence this remedy will provide. The Agency believes this remedy will result in a permanent solution to protect the public health and environment resulting from the contamination of the Site and utilizes alternative treatment technologies to the maximum extent practicable.

VII. STATE ROLE

The State of New Hampshire Department of Environmental Services, under a cooperative agreement with EPA, is the lead agency for this Site. The Remedial Investigation, Supplemental Remedial Investigation and Draft Feasibility Study were prepared under the supervision of the NHDES. The NHDES has also reviewed the Feasibility Study to determine if the selected remedy is in compliance with applicable or relevant and appropriate State environmental laws and regulations. The State of New Hampshire concurs with the selected remedy for the Keefe Environmental Services Site. A copy of the declaration of concurrence is attached as Appendix C. In accordance with §104 of CERCLA, the State of New Hampshire is responsible for 10 percent of the cost of the remedial action. In the case of the selected remedy, the State's share is estimated at $609,000.

APPENDICES

Appendix A - Keefe Environmental Services Responsiveness Summary

Appendix B - Administrative Record Index

Appendix C - State Concurrence Letter

Appendix D - State ARARs

APPENDIX A

KEEFE ENVIRONMENTAL SERVICES RESPONSIVENESS SUMMARY

EPA WORK ASSIGNMENT NO. 170-1L06
UNDER EPA CONTRACT NO. 68-01-7250

FINAL RESPONSIVENESS SUMMARY
FOR THE
KEEFE ENVIRONMENTAL SERVICES
SUPERFUND SITE
EPPING, NEW HAMPSHIRE

MARCH 1988

NOTICE

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Preface

The U.S. Environmental Protection Agency (EPA) and the New Hampshire Department of Environmental Services (NHDES) recently held a public comment period for interested parties to comment on the draft Feasibility Study (FS), and Proposed Plan prepared for the Keefe Environmental Services Superfund site. The draft FS, completed in January 1988, examines and evaluates various cleanup options, called remedial alternatives, for addressing contamination at the site. EPA announced its preferred alternatives for the cleanup of the site in the Proposed Plan issued at the start of the public comment period.

The purpose of this Responsiveness Summary is to document EPA responses to the comments and questions raised during the public comment period. EPA will consider all of the comments summarized in this document before selecting a final remedial alternative for the Keefe site.

This Responsiveness Summary is divided into the following sections:

I. Responsiveness Summary Overview - This section briefly outlines the proposed remedial alternatives as presented in the draft FS, including EPA's preferred alternativesas described in the Proposed Plan, and provides a general overview of public comments on the alternatives.

II. Background on Community Involvement and Concerns - This section provides a brief history of the site and of community interests and concerns regarding the Keefe site.

III. Summary of Comments Received During the Public Comment Period and EPA Responses to These Comments - This section summarizes both written and oral comments received from the public during the public comment period and provides EPA responses to them. These comments are categorized into responses to comments made at the hearing, and responses to comments from the Potentially Responsible Parties (PRPs).

IV. Remaining Concerns - This section describes concerns that EPA needs to address during the Remedial Design and Remedial Action (RD/RA) phase of the cleanup process.

Attachment A - This attachment includes a list of the community relations activities conducted at the Keefe Environmental Services site by the State of New Hampshire and EPA during the past five years.

I. RESPONSIVENESS SUMMARY OVERVIEW

A. Alternatives Evaluated in the FS

The draft FS identifies and evaluates nine remedial alternatives that are judged by EPA to be effective for dealing with contamination at the Keefe Environmental Services site. The nine remedial alternatives are organized into two categories: 1) source control alternatives, and 2) management of migration alternatives.

1. Source Control

The purpose of implementing a source control remedial alternative at the Keefe site is to address soil contamination, which is considered to be a source of groundwater contamination. The draft FS for the Keefe Environmental Services site evaluated the following six source control alternatives:

a. no action (soils)- involves leaving contaminants untreated on site, and fencing and monitoring the site;

b. capping - involves installing a muti-layer barrier system to keep precipitation from filtering through the contaminants and potentially spreading contamination;

c. in-situ treatment (vacuum extraction/activated carbon) - see section I., B. for description;

d. on-site low temperature thermal stripping - involves excavating contaminated soil using heated air to remove contaminants in an on-site facility;

e. soil washing - involves processing excavated soils in solvents to remove contaminants; and

f. off-site disposal - involves excavating contaminated soil and disposing of it at an off-site, EPA-approved disposal facility.

2. Management of Migration

The FS also evaluated three alternatives to manage the migration of contaminants by treating contaminated groundwater so that contaminants will not travel away from the site through the groundwater. These management of migration alternatives were:

a. no action (groundwater) - would require no treatment, only long-term montioring of contamination levels in the groundwater;

b. off-site treatment - involves pumping contaminated water for transport to an off-site waste facility; and

c. on-site air-stripping - See section I.,B. for description.

B. EPA's Proposed Plan

EPA's preferred alternative for remediation of the site is a combination of a source control alternative, In-situ Treatment (designated as SC-3 in the FS), and a management of migration alternative, On-site Air Stripping (designated as MOM-GW3B in the FS). In-situ Treatment will involve use of a vacuum extraction system, installed on the site, that causes air to flow through contaminated on-site soils, creating a transfer of the contaminants into the air. The air is collected and passed through activated carbon columns to remove contaminants. This alternative is called in-situ treatment because contamination is treated in place without disturbing site soils. After EPA conducts a pilot study to determine the effectiveness of vacuum extraction at the Keefe site, this treatment system will operate for approximately two-to-five years.

On-site Air Stripping will entail pumping contaminated groundwater out of the ground to an on-site mobile air-stripping unit where air is passed over the groundwater. The air flow strips the contaminants from the groundwater and transfers contaminants to the air. The air is passed through columns of activated carbon to remove the contaminants before the treated water is discharged to the on-site wetlands. Groundwater is to be be pumped and treated until the water meets or exceeds EPA standards for drinking water quality. This is estimated to take five years.

C. Overview of Public Comments on the Remedial Alternatives

EPA received oral comments during the public hearing, and written comments during the 30-day public comment period on the FS and Proposed Plan. Section III of this document summarizes the comments received and EPA's responses. For the purposes of this Responsiveness Summary, EPA has addressed the comments received during the public hearing separately from comments received from potentially responsible parties (PRPs). The PRPs include parties identified by EPA as having generated, transported or disposed of hazardous material at the site.

The comments received at the public hearing questioned the technical feasibility of using EPA's selected remedy for source control at the site, and addressed issues related to the protection of wetlands during site cleanup. In general, the PRPs questioned the adequacy of EPA's study both of the site and the risks posed to human health and the environment by the site; and questioned the appropriateness and cost effectiveness of EPA's proposed cleanup plan for the site.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

Keefe Environmental Services (KES) operated the 7.5 acre site as a chemical waste storage facility between 1978 and 1981. During its operation the site consisted of drum storage areas and a waste lagoon with an approximate capacity of 700,000 gallons. Wastes accepted at the site included solvents, acids, organic sludges, and caustics. The site is located about two miles southeast of the center of Epping, New Hamphshire, approximately 1000 feet north of Exeter Road. There are a dozen residences, housing approximately 30 people, near the site along Exeter Road.

Neighbors' complaints about the odors in the vicinity of the site, coupled with a town-wide fear of the potential for fire or explosion of materials handled at the site, prompted the Town of Epping to initiate legal proceedings against KES in May of 1979. At roughly the same time, the New Hampshire Bureau of Solid Waste Management and the Division of Public Health Services ordered KES to correct problems with leaking storage tanks, ruptured drums, and improperly disposed latex waste. The State issued a second cleanup order after a preliminary investigation of the site indicated that conditions at the site presented an imminent human health hazard.

News media coverage of problems at the site during this period was extensive. Local, State, and Federal officials became actively involved in seeking to end site operations and speed site cleanup. As more attention was called to the site, Epping citizens voiced their growing concerns about soil and groundwater contamination, while in the towns of Brentwood and Exeter, there was fear that nearby drinking water supplies might be contaminated by the site.

In 1981, after suffering financial difficulties, KES ceased operations and declared bankruptcy. Between 1981 and 1984 EPA and the State of New Hampshire addressed imminent public health and safety hazards posed by the site. These emergency actions included reducing the level of the waste lagoon on several occasions to control the threat of overflow. EPA and the New Hampshire Water Supply and Pollution Control Commission (NHWSPCC) also removed more than 4,000 drums, four 5,000-gallon above-ground storage tanks and four 10,000-gallon above-ground tanks of hazardous waste.

After these emergency actions were complete, active citizen involvement at the site waned. EPA reported sparse attendence at a public meeting held in August 1983 to discuss EPA plans to remove the contents of the waste lagoon for off-site disposal. The residents present at the meeting supported EPA's proposed remedy for lagoon cleanup.

Between 1983 and 1986, EPA and the State of New Hampshire conducted a joint RI/FS at the site. This two-phased study defined the nature and extent of contamination at the Keefe site and identified and evaluated alternatives to address site contamination. Since the release of the RI/FS in January 1988, the principal citizen concerns expressed about the site have been related to the effect of site contamination and remediation on wetlands in the area, and the impact of groundwater contamination and EPA's remedial action on plans to develop new drinking water supplies in the future.

III. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES TO THESE COMMENTS

EPA and NHDES conducted a formal public comment period on the remedial alternatives and EPA's Proposed Plan between January 6 and Feburary 17. The public comment period was originally scheduled to end on February 3, but was extended until February 17 at the request of one of the commenters. Four parties submitted comments to EPA during the public comment period. Three of these parties, Interex Corporation, the Keefe Negotiating Committee, and Continental Recovery Systems, submitted written comments. The New Hampshire Toxic Hazards Campaign offered oral comment at the informal public hearing held on January 20, 1988. A transcript of the public hearing is available to the public at the information repositories in the public library and Town Offices in Epping, New Hampshire, and also at EPA Region I headquarters in Boston, Massachusetts.

This section of the Responsiveness Summary presents a summary of all of the public comments offered during the public comment period, and EPA responses to these comments. Part I of this section contains responses to oral comments received at the public hearing, and Part II contains responses to comments received from the Keefe Site Negotiating Committee and Interex on behalf of the potentially responsible parties at the site.

PART I - COMMENTS FROM THE PUBLIC HEARING

The public hearing for the Keefe site was held in the Epping Town Hall in Epping, New Hampshire on January 20, 1988. At this hearing, the only comments submitted for the record were from Martha Bailey, Chairman of the New Hampshire Toxic Hazards Campaign. Below is a summary of her comments.

Comment 1:

Vacuum extraction is unfeasible for source control because the depth of the water table is too close to the surface and because limited clean water is available to cool the condenser. Therefore, low temperature thermal stripping is recommended for all contaminated soils. This would permit treatment of distressed wetland soils.

EPA Response:

Although the swampy areas of the sites have a relatively shallow water table, most of the contaminated areas can feasibly be treated with vacuum extraction. Vacuum extraction is effective for the contaminants present at the site, and is significantly less expensive than low temperature thermal stripping which would require excavation and handling of the contaminated soils on site. In areas where there is a shallow depth to groundwater it may be necessary to place vacuum extraction piping horizontally instead of vertically. This will make the process effective in such shallow areas.

The need for clean water for the condenser does not pose a problem. The vacuum extraction pilot study will determine whether or not a condenser is needed for the process, and if needed it can be designed such that the lack of clean water will not adversely affect the process.

Although low temperature thermal stripping would be more suitable for treating distressed wetlands soils, the volume of such soils is so small compared to the overall site that it would not justify incurring the additional expense of treating all soils with thermal stripping.

Distressed wetlands soils can be remediated by moving such soils to upland areas to dry out, applying vacuum extraction and restoring the wetland.

Comment 2:

Air stripping and carbon treatment will not remove all contaminants with one pass through. We do not approve of discharging partially cleaned water through the aquifer under the wetlands.

EPA Response:

The selected treatment alternative of air stripping and carbon adsorption has been proven to be effective in many applications. This treatment system is ideally suited for the removal of VOC contaminants of concern at the Keefe site. The degree of treatment required will be determined during the pilot studies. The volume of carbon may be readily increased to amounts necessary to provide the required degree of treatment. The water discharged from the treatment system will meet drinking water standards and will impose no adverse affects to the aquifer or the wetlands upon discharge.

Comment 3:

Treated groundwater should be returned up gradient to help flush the VOCs out of the water table.

EPA Response:

The surficial soils at the Keefe site consist of low permeability tills with visual evidence of leachate breakout along the slopes. Vertical flow of treated groundwater into the groundwater cannot be assured. Soil leaching would require hydraulic heads which may not be possible with shallow concrete leaching chambers. Using a mounding model, only 5-6 inches of head could be attainable, given the maximum expected treatment flows of 5 to 7 gal. per min. The slow percolation rates associated with the types of soils found at the Keefe site typically require a large leaching area constructed of shallow concrete chambers. Locating a large enough area on this relatively small site would not be possible given the areas of contaminated soils, groundwater collection trenches and other required facilities which must be accommodated.

Although soil flushing would require a minimal capital cost, the duration of operations would be controlled by the ability of the soils to assimilate and disperse the treated groundwater. With low permeability soils, and limited site area, the time required for leaching could be considerably longer than the time required to complete other source control alternatives.

Comment 4:

The wetland usually diminishes in size during the summer months due to evaporation. This would be the time to treat the stressed soil.

EPA Response:

Based on the response to Comment 1, above, distressed wetland soils can be remediated in an upland area. This does not need to be done during the summer (i.e., a period of low groundwater).

PART II - COMMENTS FROM POTENTIALLY RESPONSIBLE PARTIES

The comments from PRPs were submitted from the Keefe Site Negotiating Committee ("Committee") and from Interex Corporation ("Interex"). Since the nature of the comments from both sets of PRPs were similar, they are combined in the following section. It is noted, however, which PRP made each comment in the text of the comment.

A. RISK ASSESSMENT COMMENTS

Comment 5:

[Interex] The risk assessment (RI) was inadequate based on the analysis performed. In assessing future risks, no fate analysis of contaminants present were performed; only present contaminant levels were analyzed. Use of an additivity model for combining risks was not adequately justified and may not be appropriate. The risk analysis performed by Camp Dresser and McKee (CDM), Contractor to EPA, is unrelated to the development of remedial alternatives.

EPA Response:

The procedures used by CDM are consistent with EPA guidelines for performing risk assessments at Superfund sites (EPA PHE manual, October, 1986). EPA's recommended approach, which was used by CDM, is to calculate and present both best estimates (i.e. "most-probable case") and conservative upper-bound estimates (i.e. "worst-case") for all exposure point concentrations. According to EPA's guidelines, fate and transport analysis is performed, where appropriate, depending upon future site use, and the potential exposure pathways and receptors that are identified. If future use of site groundwater is unlikely, yet potential receptors exist offsite, then modeled or predicted contaminant levels found offsite or at the site boundary may be more appropriate to use in estimating risks. However, if future use of site groundwater is possible, as in the case of the KES site, then present on-site contaminant levels give the most probable and upper bound estimate of risk. At present, EPA believes that

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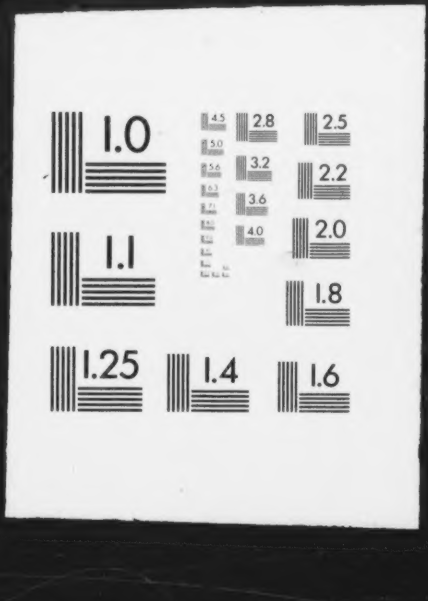
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there is no definitive information concerning future site development in the administrative record. EPA believes, therefore, that it must conservatively assume that future development is possible. Because groundwater contaminant levels onsite may either increase or decrease in the future, the present contaminant levels provide an accurate estimate of the future risk to human health.

No single approach has been recommended for multiple chemical exposures. However, EPA guidelines (Federal Register 51:34014) suggest that in the absence of available data on chemical mixtures the additivity model is adequate.

CDM's development of remedial alternatives took into account the baseline risks developed in the Remedial Investigation (RI) and Applicable or Relevant and Appropriate Requirements (ARAR's).

B. VALIDITY OF DATA

Comment 6:

[Interex] The RI contains no discussion indicating that the consultant of the government performed proper Quality Assurance/Quality Control (QA/QC) procedures either in the field or in the lab. Therefore, the sampling results are of questionable validity.

EPA Response:

The field sampling program was implemented using proper QA/QC procedures in that 20% of all samples collected were duplicate samples, field blanks and trip blank samples. Sampling procedures were followed as outlined in the Project Operations Plan for KES site (December, 1985), which included proper documentation in field log books and chain-of-custody paperwork for all samples collected.

The laboratory analysis program was implemented [illegible] accordance with EPA methods, which includes a standard QA/QC data package of blanks, duplicates and matrix spikes. Volatile and AB/N organics were analyzed using EPA Methods 624 and 625, respectively (40 CFR 136, Appendix A; Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, October, 1984).

Prior to final reporting of the analytical results, the laboratory data was subjected to a rigorous validation process by CDM. The process involved a QA/QC review of the data for the following criteria: representativeness, completeness, accuracy and precision, and correctness. The review by CDM indicated that the analytical data were of good quality. The results provide a basis for conducting further sampling in the pre-design phase of this project.

Strict QA/QC requirements for the field screening data have yet to be established. Accuracy requirements were satisfied since the analytical instruments were calibrated to known gas standards prior to the field work by an independent technician.

C. GROUNDWATER CONTAMINATION AND PROPOSED GROUNDWATER TREATMENT ALTERNATIVE

Comment 7:

[Committee] Groundwater extraction and treatment at the site is appropriate in accordance with the National Contingency Plan (NCP) and the Superfund Amendments and Reauthorization Act (SARA).

EPA Response:

Comment noted.

Comment 8:

[Committee] It does not appear that the preferred groundwater extraction technology will significantly reduce concentrations of VOCs detected in groundwater at CW-5B in the deeper portion of the overburden aquifers. It is likely that the presently proposed groundwater extraction system will have to be modified to complete groundwater cleanup to the required target levels at CW-5B.

EPA Response:

The design included in the feasibility study is a preliminary design. It is possible that this design will be modified during the detailed design phase to include pumping of certain on-site wells such as well CW-5B. The trench design has been included to intercept contaminated groundwater in the upper strata of surficial layer prior to its leaching into the wetland areas.

Comment 9:

[Interex] Evidence of groundwater contamination is confined to the shallow aquifer and indicates no threat to offsite receptors. It is likely that bedrock contamination is due to the drilling and installation of bedrock aquifer monitoring wells.

Action should be taken immediately to close any conduits of contaminants to the bedrock aquifer, including well CW-C3. To the extent that any groundwater remediation is deemed necessary, it should be implemented only in the overburden aquifer.

EPA Response:

Although the overburden or bedrock aquifer does not currently pose a threat to any off-site receptors, CERCLA Section 121 requires EPA to consider "short and long-term potential for adverse health effects from human exposure." Since there is potential for future human exposure to groundwater, to comply with ARARs, the overburden and bedrock aquifers must be treated although there are no current receptors.

While it is possible that the contaminants which are present in well CW-C3 are due to the well installation process, since the wells have been completed there should no longer be a current conduit of contaminants to the bedrock. However, since this localized area is contaminated, this well will be pumped and the water sent to the treatment system. The pumping flow rate of this well will be carefully determined such that a large drawdown does not occur further contaminating the bedrock aquifer.

Comment 10:

[Interex] The preferred alternative does not satisfy the requirements of the Superfund Amendments Reauthorization Act of 1986 (SARA) with respect to choice of remedial action. Section 121 requires that the proposed remedy be based on an analysis of the risks actually presented to human health and the environment by any contamination at a site. Analysis of the RI/FS demonstrates that choice of a soil remedy on the basis of the RI would be arbitrary and capricious.

EPA Response:

Section 121 of CERCLA does not require analysis of "the risks actually" presented to human health and the environment." In fact, Section 121 requires EPA to take into account "short and long-term potential for adverse health effects from human exposure," and "the potential threat to human health and the environment" associated with certain remedial action.

Although EPA agrees that additional soil sampling and analysis is required to verify the extent of contaminated soil, the RI contains sufficient data on which to conclude that the selected soil remedy is consistent with CERCLA and the NCP.

Comment 11:

[Interex] Two groundwater treatment alternatives, MOM-GW3A and MOM-GW3B, are identical except that MOM-GW3A proposes discharge to the Unnamed Tributary rather than to the groundwater. MOM-GW3A was rejected for one reason only, that discharge to the stream would require a permit, presumably a NPDES permit. However, CERCLA, the NCP, and EPA Guidance are clear that on-site remedial activities do not require permits. Therefore, rejection of this alternative was incorrect as a matter of law. Moreover, if a NPDES or state permit were required, this is not a basis for rejection of this alternative where there is no indication that there would be any problem obtaining such a permit.

EPA Response:

The screening out of Alternative MOM-GW3A, Air Stripping/Filtration/Carbon Absorption (Discharge to Stream) was not based solely on the reason that a discharge permit would be required. Technical, as well as permitting considerations formed the basis of favoring Alternative MOM-GW3B (Discharge to Groundwater) over MOM-GW3A (Discharge to Stream). From a technical standpoint the pumping of groundwater from the surficial aquifer without recharge may have adverse effects on wetlands on and adjacent to the site. It is environmentally better to discharge back to groundwater to maintain the wetlands as opposed to a direct discharge to the tributary.

Comment 12:

[Interex] The entire RI/FS process and selection of preferred alternatives was driven by the assumption that residential development would occur on site. However, that assumption is speculative and is not supported by the record. On the contrary, the evidence suggests that residential development is not likely to occur onsite. Since it is entirely speculative that onsite groundwater will ever be used for drinking water purposes, and since the RI/FS negates the risk from offsite migration of contaminated groundwater, EPA should have exercised its discretion under SARA, Section 121 (b)(1), to select other remedial alternatives that do not provide for groundwater cleanup to drinking water standard, or should have considered other, less stringent applicable or relevant and appropriate groundwater standards.

EPA Response:

The future development of the site for residential development, is certainly a possibility. The comment from Interex included a letter from real estate broker Paul Spidle, that states, "Future residential development of the Keefe Site cannot be absolutely ruled out ...". Zoning changes, variances and granting of special permits, are all future possibilities. Furthermore any type of nonresidential development, whether commercial, institutional, or industrial will require some type of water supply for consumption, waste disposal, or process use by the people employed at or occupying the facilities. Cleanup to drinking water standards will provide a permanent remedy and allow unrestricted future development of the site and adjacent areas and comply with EPA's Groundwater Protection Strategy.

D. SELECTION OF REMEDIAL ALTERNATIVE

Comment 13:

[Committee] The baseline risk assessment performed during the RI concluded that "insignificant risk" was associated with human exposure to measured levels of VOCs in soil. Therefore, no soil remediation would be needed for human health and safety considerations based on analytical soil data collected during the RI.

EPA Response:

Although the risk assessment indicates that there is no direct risk associated with dermal contact or inhalation of the soil contaminants, these contaminants will leach out, due to rainwater infiltration through the soil, and further contaminate the groundwater. These soils then act as a source of contamination which must be removed in order to have an efficient and effective groundwater remediation program.

Comment 14:

[Interex] Soil data collected during the RI indicted concentrations of VOC's either below detection limits or significantly lower than concentrations found in on-site groundwater, and therefore do not show that the soil is a current source of groundwater contamination. The potential source control remedies considered have been based solely on the need to protect potential onsite groundwater users. The five indicator compounds, used as a surrogate for alleged health risks at the site, are either not found in the soils, or are found at very low levels. There is no basis therefore, for source control remedies. The delineation of contaminated soil is unsupported by hard analytical data.

EPA Response:

The lack of a large body of high quality soils data has been discussed in the FS. This fact has necessitated the use of theoretical models as discussed in the FS to estimate contaminant levels that could be present in the soils at the site. The procedures used to estimate soil contamination was based upon established estimating procedures which yielded reasonable results. (Refer to pages 4-24 through 4-26 of the FS.) Soil cleanup goals are based on achieving cleanup goals in groundwater below the site that are protective of public health and the environment. As discussed in the FS, additional soil sampling will be performed during the pre-design stage. Based on the results of this additional soil sampling, areas where contaminant levels exceed any of the soil cleanup goals will be subject to remediation. In areas where contaminant concentrations are equal to or less than all of the soil cleanup goals, no further action will occur.

Comment 15:

[Committee] Additional soil quality data and re-evaluation of the screened alternatives for source reduction are needed prior to finalizing the EPA Record of Decision (ROD). The Keefe site PRPs should be given the opportunity to review the additional data and re-evaluation prior to finalizing the Record of Decision.

EPA Response:

There is no need for additional soils data prior to finalizing the ROD. A sensitivity analysis comparing the costs of vacuum extraction vs. low temperature thermal stripping remedial source control alternatives with decreasing quantities of contaminated soils is presented below:

	Vacuum Extraction		Low Temperature Thermal Stripping	
Quantity of Contaminated Soils	Duration of Operations	Estimated Cost	Duration of Operations	Estimated Cost
21,000 c.y.	5 yrs.	$4,332,200	2 yrs.	$6,519,000
10,500 c.y.	2.5 yrs.	$2,917,600	1 yr.	$5,273,700
5,250 c.y.	15 mos.	$2,078,200	6 mos.	$4,657,800

See Table 1 for background computations.

The estimated costs shown above have been developed on the premise that completing clean-up of contaminated soils in as short a time as possible is the best and most logical approach to remediate the Keefe site. Equipment for operations of a six month duration or longer would be of the same size and require the same input of labor, power and other operations and maintenance costs, but for shorter durations. If the quantity of soils at the site requiring treatment were found to be substantially less than 25% of the presently estimated quantity, vacuum extraction would again be the preferred recommendation for source control remediation as it is more conducive to scaling down because vacuum extraction equipment is more readily available in a wide range of sizes off the shelf as opposed to low temperature thermal stripping equipment. Regardless of the quantity of soils requiring treatment, fewer adverse environmental impacts are associated with in-situ treatment technologies such as vacuum extraction as opposed to those technologies requiring excavation, handling, and transport of contaminated soils.

As indicated in the FS, additional soil sampling will be performed during the pre-design phase to better define the extent of current soil contamination. If minimal soil contamination is found, the vacuum extraction alternative will be scaled down to the appropriate level. This ability to scale down is an advantage of vacuum extraction over other remedial technologies involving significant equipment mobilization and set-up on site.

E. EFFECTIVENESS OF SELECTED ALTERNATIVE AND OTHER ALTERNATIVES

Comment 16:

[Committee] The technical feasibility of soil vacuum extraction at the site is questionable. Submergence of the vapor extraction wells due to shallow groundwater conditions could minimize the effectiveness of soil vacuum extraction in two of the four areas proposed for application of this technology. Moreover, previous field applications of this technology have not demonstrated the capability for soil cleanup to required target levels during the proposed period of application.

EPA Response:

Vacuum extraction is a vadose zone treatment process and therefore the extraction wells cannot be extended into the water table. However, these wells would be placed as close as functionally possible to the saturated zone, if soil target levels are found to be exceeded during further on site soil sampling activities. There is concern that due to the close proximity of the water table, large amounts of water may be removed by the applied suction. To avoid this problem, an adequately sized air/water separator will be located between the wells and the pump. The extracted water will be "trapped" and either added to the groundwater treatment system or discharged to an appropriate location. Data obtained by CDM while under contract with EPA to prepare the report entitled "Field Evaluation of Terra Vac Corrective Action Technology at a Florida LUST Site" (December 1987) has shown this extracted water to be contaminant free since it has already been subjected to a form of air stripping. Field sampling and testing of any extracted groundwater will be employed to test this assumption. (CDM is presently involved in operating 3 vapor extraction sites in New York, New Jersey, and California further testing this assumption.) In locations where there is a shallow vadose zone of approximately two feet or less, it will be necessary to place vacuum extraction pipes horizontally instead of vertically. In addition, a temporary impermeable cap over the area of concern may be justified if wells are placed horizontally. The cap would serve to minimize the amount of clean ambient air being drawn into the system. These issues would be addressed in the pre-design phase and pilot studies. A minimum vadose zone thickness could then be established for vacuum extraction. Below this minimum thickness the remediation would become a saturated soil issue which will be treated by the proposed groundwater extraction and treatment system.

A high water table produces operational problems with any type of soil treatment system, especially those which require the soils to be heated, as the heating of water requires input of large amounts energy. In addition, the excavation and handling of wet, nearly saturated soils is difficult as these soils tend to become somewhat fluidic.

In one case conducted by Midwest Water Resources, Inc. of Charlotte, Michigan, developers of the Vaportech^{TM} process, the vacuum extraction technology has demonstrated the capability to remove volatile organics to below 40 ppb or non-detectable levels.

Comment 17:

[Committee] The cost-effectiveness of soil vacuum extraction at the site is questionable. Uncertainties regarding the required time for application and the corresponding uncertainties relative to the present worth of annual operation and maintenance costs were not addressed in the FS cost evaluation.

EPA Response:

If the operation and maintenance (O&M) of this system exceeds the five year estimated time of implementation then another alternative such as low temperature thermal stripping or soil flushing may be more cost effective, therefore, the five year estimate for cleanup is the main focus of this response. There is always some degree of uncertainty associated with any in-situ remedial action. The estimated cleanup time was based upon case studies and the vacuum extraction experiences of CDM.

One particular case study involved the removal of leaked gasoline from a sand clay soil matrix in central Florida. At the Florida site, after nine months of operation, soil contaminant levels decreased from thousands of ppm's to non-detectable levels (<100 ppb). At a site in New Jersey, over 500 lbs of TCE, methylene chloride, vinyl chloride, and Trans 1,2-Dichloroethane were removed from two different glacial till stratas in five weeks of operation. The data from this site indicated that 18,000 yd^3 of contaminated soil was decontaminated to less than 40 ppb. Over 400,000 yd^3 of soils contaminated with paint solvents and ketones were successfully remediated at another site in Ohio. At the Ohio site, over 3700 lbs of waste was removed from the soil in 11 weeks of operation.

Comment 18:

[Committee] Natural source reduction and groundwater treatment for a 30-year period would attain both federal and state applicable or relevant and appropriate public health and environment requirements, and is 2.9 million dollars less than the present worth cost for the EPA-selected alternative including vacuum extraction.

EPA Response:

Section 121(b) states that "Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment". In accordance with OSWER Directive 9355.0-19 costs may be used to discriminate among treatment alternatives, but not between treatment and non-treatment alternatives.

Comment 19:

[Committee and Interex] Selection of soil vacuum extraction as the most cost-effective alternative did not appear to adequately consider the significant uncertainties regarding the required time for application. If the required time for application of soil vacuum extraction extends to more than five years, an alternative source reduction method, such as low temperature volatilization or soil flushing, could be more cost-effective. Cost-effective combination remedies such as soil flushing were ignored because the analysis of preferred alternatives generally treats source control and management of migration separately.

EPA Response:

Typical treatment times range from 3 to 6 months based on the cases noted in EPA response to Comment 15 and the five-year estimate is considered to be very conservative. Five years was used since there is some uncertainty associated with the exact location and volume of soils which need to be treated. Treatment duration may be close to the five year conservative estimate if most of the contaminated soils are found to be in the low lying areas which will most probably be very wet and highly organic. On the other hand, if most of the contamination is in the sandy till, upgradient of Well CW-3A, the treatment times are expected to be less than the five year estimate. At present there is no reason to believe that vacuum extraction will require more than 5 years of operation. Pilot plant studies during the pre-design stage will help verify the estimated treatment periods.

In general, the surficial soils at the Keefe site are low permeability tills. Soils of this type are not conducive to soil flushing. The high water table at the Keefe site requires a large portion of the remediation to be groundwater extraction and treatment.

Refer to the response to Comment 3 on page 7 addressing the soil flushing alternative.

TABLE 1

SENSITIVITY ANALYSIS BACKGROUND CALCULATIONS

Vacuum Extraction

Quantity	Time	Annual O&M Costs	Present Worth Cost Factor	Total P.W. of O&M Costs	Capital Costs	Total Present Worth Costs
21,000 c.y.	5 yrs.	$842,500	2.791	$3,193,900	$1,138,270	$4,332,170
10,500 c.y.	2.5 yrs.	$842,500	2.112	$1,779,360	$1,138,270	$2,917,630
5,250 c.y.	1.25 yrs.	$842,500	1.116	$ 939,977	$1,138,270	$2,078,247

Low Temperature Thermal Stripping

Quantity	Time	Annual O&M Costs	Present Worth Cost Factor	Total P.W. of O&M Costs	Capital Costs	Total Present Worth Costs
21,000 c.y.	2 yrs.	$1,505,550	1.736	$2,614,000	$3,905,000	$6,519,000
10,500 c.y.	1 yr.	$1,505,550	.9091	$1,368,696	$3,905,000	$5,273,696
5,250 c.y.	6 mos.	$1,505,550	.500	$ 752,775	$3,905,000	$4,657,775

IV. REMAINING CONCERNS

During the public comment period, and at the public informational meeting on the FS held by EPA in Epping on January 6, 1988, local officials and representatives of the PRPs suggested issues that may continue to be of concern during the design and implementation of EPA's selected remedy for the site. These issues and concerns include the following:

(A) Availability of Remedial Design Information

Potentially Responsible Parties at the site have asked to have access to new information about site characteristics and contamination that are gathered during the pilot study and design of EPA's selected remedial alternative. The potentially responsible parties would like to review and comment on any new data collected before EPA implements the remedy.

(B) Continuing Coordination between the Town of Epping and EPA and/or the New Hampshire Department of Environmental Services (NHDES)

Residents and Town officials present at the January 6, 1988 informational public meeting asked a number of questions about how site remediation will affect plans for future development in Epping. Town officials in particular wanted to know whether developing new water supplies concurrently with the pumping and treating of site groundwater could result in accelerated migration of contaminants into the water supply. NHDES suggested that the Town of Epping refer any development plans to the State to address the potential impacts of site remediation on proposed development on a case-by-case basis.

(C) Continued Testing of Domestic Wells

Citizens present at the informational meeting on January 6 asked that residential wells continue to be tested during the remedial design and remedial action. NHDES said domestic wells would be sampled twice annually throughout the site remediation process.

ATTACHMENT A

COMMUNITY RELATIONS ACTIVITIES
AT THE
KEEFE ENVIRONMENTAL SERVICES SITE

Community relations activities conducted at the Keefe Environmental Services Superfund site to date have included:

- January 4, 1983 - The New Hampshire Water Supply and Pollution Control Commission (NHWSPCC) and EPA held a public meeting to discuss on-going removal actions and off-site disposal of the lagoon contents.
- July 29, 1983 - NHWSPCC and EPA issued a public notice inviting public review and comment on the fast-track feasibility study for remediation of the site lagoon.
- August 11, 1983 - NHWSPCC and EPA conducted a public meeting to discuss the FS alternatives for lagoon cleanup.
- December 1983 - NHWSPCC and EPA released a Community Relations Plan outlining citizen concerns about the site and a program to address those concerns and to keep citizens informed about and involved in site activities.
- August 6, 1985 - NHWSPCC and EPA issued a public notice announcing the availability of the Keefe site Remedial Investigation report.
- August 28, 1985 - NHWSPCC and EPA held a public meeting to present the results of the draft Remedial Investigation and answer questions from the public.
- October 28, 1985 - EPA initiated a 30-day public comment period on the 5.7 million dollar settlement negotiated with the potentially responsible parties at the site.
- January 6, 1985 - The New Hampshire Department of Environmental Services (NHDES) and EPA conducted a public meeting to discuss the draft Feasibility Study for the site, and issued a public notice announcing the 30-day public comment period on the remedial alternatives in the FS and EPA's Proposed Plan. EPA and NHDES also issued a fact sheet summarizing the FS alternatives, the Proposed Plan, and the public comment process.
- January 20, 1988 - NHDES and EPA conducted an informal public hearing on the remedial alternatives evaluated in the FS.

EPA reports, documents, and public information fact sheets related to the site are available to the public at the information repositories located at the Epping Town Offices and Epping Public Library.

APPENDIX B

ADMINISTRATIVE RECORD INDEX

Keefe Environmental Services

NPL Site Administrative Record

Index

As of March 21, 1988

Prepared for

Region I
Waste Management Division
U.S. Environmental Protection Agency

With Assistance from

AMERICAN MANAGEMENT SYSTEMS, INC.
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Introduction

This document is the Index to the Administrative Record for the Keefe Environmental Services National Priorities List (NPL) site. Section I of the Index cites site-specific documents, and Section II cites guidance documents used by EPA staff in selecting a response action at the site.

The Administrative Record is available for public review at EPA Region I's Office in Boston, Massachusetts, and at The Epping Library in Epping, New Hampshire. Questions concerning the Administrative Record should be addressed to the EPA Region I site manager.

The Administrative Record is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA).

Section I

Site Specific Documents

ADMINISTRATIVE RECORD INDEX

for the

Keefe Environmental Services NPL Site

1.0 Pre-Remedial

1.3 Site Inspection

1. 2 "Potential Hazardous Waste Site - Site Inspection Report" Forms, EPA Region I (January 29, 1980; January 31, 1980).

1.12 Hazard Ranking Package

1. "Mitre Model Scoring of Keefe Environmental Service New Hampshire," Ecology and Environment, Inc. (October 23, 1981).

1.13 FIT Related Correspondence

1. Letter from EPA Region I to Member of the Public (December 8, 1981).

1.18 FIT Technical Direction Documents (TDDs) and Associated Records

1. "Hazardous Waste Site Investigation Section 311 Applicability Study Lagoon," Ecology and Environment, Inc. (March 8, 1981).
2. Set of Sampling Results for On-Site Monitoring Wells, Off-Site Residential Wells and Surface Water, Ecology and Environment, Inc. (1979 through 1981 - 2 Copies).
3. "Site Inspection and Proposed Work Plan for Keefe Environmental Services," Ecology and Environment, Inc. (March 24, 1982).

2.0 Removal Response

2.1 Correspondence

1. Letter from EPA Region I to Fowler, N. (January 20, 1982).
2. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (March 8, 1982).
3. Letter from EPA Region I to Member of the Public (March 8, 1982).
4. Letter from Member of the Public to EPA Region I (March 18, 1982).
5. 2 Letters from New Hampshire Water Supply and Pollution Control Commission to Members of the Public (All March 24, 1982).
6. 7 Letters from New Hampshire Water Supply and Pollution Control Commission to Members of the Public (All March 31, 1982).
7. Letter from New Hampshire Water Supply and Pollution Control Commission to Member of the Public (April 13, 1982).
8. 3 Letters from New Hampshire Water Supply and Pollution Control Commission to Members of the Public (All June 28, 1982).
9. Letter from New Hampshire Water Supply and Pollution Control Commission to Member of the Public (July 30, 1982).
10. Letter from Camp Dresser & McKee Inc. to New Hampshire Department of Health and Welfare, Bureau of Hazardous Waste Management (October 28, 1982).

11. Letter from New Hampshire Department of Health and Welfare, Bureau of Hazardous Waste Management to Camp Dresser & McKee Inc. (November 5, 1982).
12. 7 Letters from New Hampshire Water Supply and Pollution Control Commission to Members of the Public (All February 22, 1983).
13. Letter from New Hampshire Water Supply and Pollution Control Commission to Member of the Public (April 14, 1983).
14. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Headquarters (May 27, 1983).
15. Letter from New Hampshire Water Supply and Pollution Control Commission to Resource Technology Services, Inc. (June 29, 1983).
16. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (July 21, 1983).
17. Letter from New Hampshire Water Supply and Pollution Control Commission to Resource Technology Services, Inc. (August 4, 1983).
18. Letter from New Hampshire Water Supply and Pollution Control Commission to NUS Corporation (February 3, 1986).
19. Letter from NUS Corporation to EPA Region I (March 11, 1986).
20. Internal EPA Region I Letter (April 25, 1986).
21. Letter from Mini Warehousing, Inc. to EPA Region I (May 15, 1986).
22. Letter from NUS Corporation to EPA Region I (June 30, 1986).
23. Letter from NUS Corporation to EPA Region I (March 26, 1987).
24. 27 Sets of Material Safety Data Sheets (Dates Not Available).
25. Set of EPA Region I Meeting Notes, Meeting with the Generators (September 1982).
26. Letter from CECOS International, Inc. to EPA Region I (October 15, 1982).

2.2 Removal Action Decision Documents

1. "Field Reports," Recra Research, Inc. (October 8, 1979).
2. "Waste Characterization of the Samples Taken from Keefe Environmental Services," Recra Research, Inc. (October 8, 1979).
3. 2 Sets of Data Summaries, Recra Research Inc. (October 8, 1979; October 11, 1979).
4. Emergency Action Plan, EPA Region I (June 1981).
5. "Assessment of Alternatives for Temporary Stabilization of a Lagoon Containing Hazardous Wastes Located Near Epping, New Hampshire," Ecology and Environment, Inc. (January 13, 1982).
6. "Justification Document for Lagoon Contents Removal and Decommissioning," Tighe & Bond (July 29, 1983).
7. "Justification Document for Lagoon Contents Removal and Decommissioning," Tighe & Bond (Revised August 31, 1983).
8. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (September 8, 1983).
9. Internal EPA Region I Letter (November 4, 1983).
10. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (June 6, 1985).
11. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (June 20, 1985).
12. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (August 6, 1985).
13. Trip Report, NUS Corporation (December 6, 1985).
14. "Keefe Hazardous Waste Site Safety Plan," EPA Region I (July 1, 1982).
15. "Site Specific Annex for Keefe Environmental Services," EPA Region I (July 1982).

2.3 Sampling and Analysis Data

In addition to the entries cited below, there is sampling and analysis data pertaining to the Removal Response phase which may be viewed, by appointment only, at EPA Region I, Boston, Massachusetts.

1. Set of Lagoon Sampling Data, New Hampshire Water Supply and Pollution Control Commission (November 26, 1979).
2. Set of Data Report Sheets, EPA Region I (March 5, 1981 through April 8, 1981).
3. "Field Observations During Lagoon Sampling at Keefe Environmental Services," Ecological Analysts, Inc. (July 18, 1983 through July 26, 1983).
4. "Results of Analysis of Samples Collected from Keefe Environmental Services," Ecological Analysts, Inc. (July 25, 1983 through July 26, 1983).
5. "Task 3 Sample Inventory," GCA Corporation (October 21, 1983).
6. "Keefe Environmental Services: Trailer Decontamination Results," NUS Corporation (July 24, 1986).
7. 2 Sets of Organics Analysis Data Sheets, Ecology and Environment, Inc. (Dates Not Available).
8. 1 Set of Lab Packing Slips, EPA Region I (Date Not Available).
9. 1 Set of Data Report Sheets, EPA Region I (March 1981).
10. 1 Set of Purgeable Organics Analysis Data, EPA Region I (May 17, 1982).
11. "Analytical Results Keefe Environmental Services," CECOS International, Inc. (November 24, 1982).

2.4 Pollution Reports (POLREPs)

1. 25 Sets of POLREPs, EPA Region I (February 27, 1981 through September 24, 1982).

2.6 Work Plans and Progress Reports

1. "Operations Plan," EPA Region I (July 1, 1982).
2. 2 Sets of Environmental Response Team Field Project Reports, EPA Environmental Response Team (November 2-7, 1981; March 29-April 2, 1982).

2.9 Action Memoranda

1. "Procurement Request Rationale," EPA Region I (Date Not Available).

3.0 Remedial Investigation (RI)

3.1 Correspondence

1. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (January 13, 1983).
2. Letter from State of New Hampshire Attorney General to EPA Region I (April 4, 1983).
3. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (June 30, 1983).
4. Letter from Leggette, Brashears & Graham, Inc. to EPA Region I (November 17, 1983).
5. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (February 6, 1984).
6. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (February 27, 1984).

7. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (June 4, 1984).
8. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (June 21, 1984).
9. Letter from Tighe & Bond to New Hampshire Water Supply and Pollution Control Commission (July 12, 1984).
10. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (October 29, 1985).
11. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (January 7, 1986).
12. Letter from Camp Dresser & McKee Inc. to EPA Region I (May 21, 1986).
13. Letter from Camp Dresser & McKee Inc. to EPA Region I (September 17, 1986).
14. Letter from New Hampshire Water Supply and Pollution Control Commission to Camp Dresser & McKee Inc. (January 20, 1987).

3.2 Sampling and Analysis Data

1. Set of Well Logs, Leggette, Brashears & Graham, Inc. (April 11, 1984).
2. Set of Organic Chemical Analyses, New Hampshire Water Supply and Pollution Control Commission (April 20, 1984).
3. Set of Well Sampling Data, New Hampshire Water Supply and Pollution Control Commission (September 19, 1984 through September 28, 1984).
4. Set of Organic Chemical Analyses, New Hampshire Water Supply and Pollution Control Commission (August 12, 1985).

3.4 Interim Deliverables

1. "Remedial Action Master Plan," Camp Dresser & McKee Inc. (October 1, 1982).
2. "Safety Plan for Conducting Field Activities," Ecological Analysts, Inc. (September 2, 1983).
3. Set of Comments from EPA Region I on the September 2, 1983 "Safety Plan for Conducting Field Activities," (Date of Comments Not Available).
4. "Summary of Existing Data," Camp Dresser & McKee Inc. (October 4, 1985).
5. "Project Operation Plan," Camp Dresser & McKee Inc. (December 6, 1985).
6. "Summary of Existing Data," Camp Dresser & McKee Inc. (January 13, 1986).

3.6 Remedial Investigation (RI) Reports

1. "Remedial Investigation Report - Volume I," Tighe & Bond (Revised April 1985).
2. "Remedial Investigation Report - Volume II," Tighe & Bond (Revised April 1985).
3. Set of Comments from EPA Region I on the Revised April 1985 "Remedial Investigation Report" (Date of Comments Not Available).
4. "Draft Supplemental Remedial Investigation Report," Camp Dresser & McKee Inc. (December 1987).
5. "Draft Appendices (RI)," Camp Dresser & McKee Inc. (December 1987).
6. Set of Comments from Continental Recovery Systems Inc. on the December 1987 "Draft Supplemental Remedial Investigation Report and Draft Feasibility Study" (Set of Comments Dated January 19, 1988).
7. Set of Comments from the PRP Negotiating Committee on the December 1987 "Draft Supplemental Remedial Investigation Report and Draft Feasibility Study" (Set of Comments Dated February 2, 1988).

8. Set of Comments from Interex Corporation on the December 1987 "Draft Supplemental Remedial Investigation Report and Draft Feasibility Study" (Set of Comments Dated February 3, 1988).
9. Set of Comments from Interex Corporation on the December 1987 "Draft Supplemental Remedial Investigation Report and Draft Feasibility Study" (Set of Comments Dated February 17, 1988).

4.0 Feasibility Study (FS)

4.1 Correspondence

1. 4 Letters from New Hampshire Water Supply and Pollution Control Commission to Members of the Public (All January 29, 1986).
2. Letter from New Hampshire Water Supply and Pollution Control Commission to Member of the Public (March 10, 1986).
3. Letter from New Hampshire Water Supply and Pollution Control Commission to Member of the Public (April 3, 1986).
4. 8 Letters from New Hampshire Water Supply and Pollution Control Commission to Members of the Public (All October 21, 1987).

4.2 Sampling and Analysis Data

1. 2 Sets of Sampling Data, New Hampshire Water Supply and Pollution Control Commission (June 1986 through July 1986; July 1987).

4.6 Feasibility Study (FS) Reports

1. "Draft Feasibility Study," Camp Dresser & McKee Inc. (December 1987).
2. "Draft Appendices (FS)," Camp Dresser & McKee Inc. (December 1987).

4.9 Proposed Plan for Selected Remedial Action

1. "Proposed Plan Keefe Environmental Services," EPA Region I (December 22, 1987).

9.0 State Coordination

9.1 Correspondence

1. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (October 13, 1982).
2. Letter from Camp Dresser & McKee Inc. to EPA Region I (October 22, 1982).
3. Letter from New Hampshire Water Supply and Pollution Control Commission to Camp Dresser & McKee Inc. (October 29, 1982).
4. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (November 8, 1982).
5. Letter from Resource Technology Services, Inc. to New Hampshire Water Supply and Pollution Control Commission (December 3, 1982).
6. Letter from New Hampshire Water Supply and Pollution Control Commission to Resource Technology Services, Inc. (December 6, 1982).
7. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (December 9, 1982).
8. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (February 9, 1983).
9. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (March 30, 1983).

10. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (May 5, 1983).
11. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (May 12, 1983).
12. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (May 17, 1983).
13. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (May 27, 1983).
14. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (August 15, 1983).
15. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (September 16, 1983).
16. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (October 6, 1983).
17. 2 Letters from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (Both October 18, 1983).
18. Letter from New Hampshire Water Supply and Pollution Control Commission to D'Appolonia Waste Management Services (October 21, 1983).
19. Letter from New Hampshire Water Supply and Pollution Control Commission to Resource Technology Services, Inc. (October 21, 1983).
20. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (October 25, 1983).
21. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (December 1, 1983).
22. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (January 24, 1984).
23. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (January 30, 1984).
24. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (March 6, 1984).
25. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (June 29, 1984).
26. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (July 5, 1984).
27. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (July 9, 1984).
28. Set of EPA Region I Meeting Notes, Meeting with State of New Hampshire (January 8, 1982).

9.2 Cooperative Agreements

1. "Quality Assurance & Control Program," New Hampshire Water Supply and Pollution Control Commission (December 7, 1981).

9.5 Quarterly Progress Reports

1. 15 Quarterly Progress Reports, New Hampshire Water Supply and Pollution Control Commission (March 31, 1983; June 30, 1983; September 30, 1983; December 31, 1983; March 31, 1984; June 30, 1984; September 30, 1984; December 31, 1984; March 31, 1985; June 30, 1985; September 30, 1985; December 31, 1985; March 31, 1986; June 30, 1986; September 30, 1986).

10.0 Enforcement

10.3 Historical Enforcement Actions

1. Affidavit of Stanczyk, T. (October 12, 1979).
2. Affidavit of Kurz, S., Ph.D. (October 12, 1979).
3. Affidavit of Soik, W. (October 12, 1979).
4. Petition for Injunctive and Other Relief, Town of Epping vs. Paul A. Keefe, Keefe Environmental Services, Inc. and Amex, Inc. (December 7, 1979).
5. Motion for Temporary Injunction, State of New Hampshire v. Paul A. Keefe, Keefe Environmental Services, Inc. and Amex, Inc. (February 26, 1980).
6. Master's Report, Town of Epping vs. Paul A. Keefe et al. (April 23, 1980).
7. Master's Report, Town of Epping and the State of New Hampshire vs. Paul A. Keefe, Keefe Environmental Services, Inc., and Amex, Inc. (September 9, 1980).
8. Writ of Attachment and Trustee Process, State of New Hampshire vs. Paul A. Keefe, Keefe Environmental Services, Inc., and Amex, Inc. (June 5, 1981).
9. Petition for Emergency Relief, Town of Epping v. Paul A. Keefe, K.E.S., Inc. and Amex, Inc. (March 18, 1981 - 4 Copies).
10. Order on the Motion for Clarification, Town of Epping, et al. vs. Keefe, et al. (May 25, 1981).
11. Writ of Attachment and Trustee Process, Town of Epping vs. Paul A. Keefe, K.E.S., Inc, and Amex, Inc. (May 19, 1981).
12. Agreement between the State of New Hampshire and the Davidson Rubber Division of Ex-Cell-O Corporation (June 11, 1981).
13. Letter from Keefe Environmental Services, Inc. to New Hampshire Department of Health and Welfare, Bureau of Solid Waste Management (April 30, 1980).
14. Internal New Hampshire Department of Health and Welfare, Bureau of Solid Waste Management Letter (May 22, 1980).
15. Letter from New Hampshire Department of Health and Welfare, Bureau of Solid Waste Management to Keefe Environmental Services, Inc. (June 12, 1980).
16. Internal New Hampshire Water Supply and Pollution Control Commission Letter (September 9, 1980).
17. Letter from State of New Hampshire Attorney General to Robertson, B., Esq. (December 2, 1980).
18. Letter from New Hampshire Department of Health and Welfare, Bureau of Solid Waste Management to Rooney, J. (December 18, 1980).
19. Letter from State of New Hampshire Attorney General to Analog Devices, et al. (Date Not Available).

10.8 Consent Decrees

1. Consent Decree, United States v. Data General Corp., et al. (October 10, 1985).
2. Consent Decree - Appendix C, United States v. Data General Corp., et al. (October 28, 1985).
3. Motion to Stay with Concurrence, Davidson Rubber Company (November 11, 1985).
4. Letter from U.S. Department of Justice, Environmental Enforcement Section to Settling Parties in United States v. Data General Corp., et al. (November 13, 1985).
5. Notice for Comment Period on Consent Decree, United States v. Data General Corp., et al. (December 23, 1985).
6. Motion to Amend Complaint, United States v. Data General Corp., et al. (January 15, 1986).
7. Judgement Entered in Accordance with the Approval of the Parties Consent Decree, United States v. Data General Corp., et al. (March 19, 1986).

8. Letter from U.S. Department of Justice, Environmental Enforcement Section to Counsel for Settling Parties (March 21, 1986).

10.9 Pleadings -- Directly Related to Trial

1. Complaint, United States of America v. Data General, et al. (Date Not Available).

11.0 Potentially Responsible Party (PRP)

11.7 PRP Steering Committee Documents

The record cited below may be reviewed, by appointment only, at EPA Region I, Boston, Massachusetts.

1. "Drum Removal and Disposal from the Keefe Environmental Services Site in Epping, New Hampshire - Prepared for Keefe Generators Committee," Chemical Waste Management, Inc. (November 4, 1982).

11.9 PRP-Specific Correspondence

1. Master Notice Letter from EPA Region I (March 5, 1982).
2. Master Notice Letter from EPA Region I (August 24, 1982).
3. Master Notice Letter from EPA Region I (November 9, 1982).
4. Notice Letter from EPA Region I to A.B. Dick Company (October 8, 1982).
5. Notice Letter from EPA Region I to Abbot Machine (October 8, 1982).
6. Notice Letter from EPA Region I to Allied Resin Corporation (August 24, 1982).
7. Notice Letter from EPA Region I to Aluminum Processing Corporation (January 16, 1985).
8. Notice Letter from EPA Region I to American Hoist Crosby - Laughlin (November 9, 1982).
9. Notice Letter from EPA Region I to Amstar Corporation (August 24, 1982).
10. Notice Letter from EPA Region I to Analog Devices (October 8, 1982).
11. Notice Letter from EPA Region I to Applied Circuits (September 2, 1982).
12. Notice Letter from EPA Region I to ATC Petroleum, Inc. (October 8, 1982).
13. Notice Letter from EPA Region I to Atkins and Merrill, Luminescent Systems, Inc. (August 24, 1982).
14. Notice Letter from EPA Region I to Atlantic Laminates, Oak Materials Group, Inc. (August 24, 1982).
15. Notice Letter from EPA Region I to Bacon Inc. (November 9, 1982).
16. Notice Letter from EPA Region I to Bay Head Products Corp. (October 8, 1982).
17. Notice Letter from EPA Region I to Beede Waste Oil Corporation (August 24, 1982).
18. Notice Letter from EPA Region I to Ben-Mont Corporation (November 9, 1982).
19. Notice Letter from EPA Region I to Bendix Corp. (October 8, 1982).
20. Notice Letter from EPA Region I to Bergen-Paterson Corporation (November 9, 1982).
21. Notice Letter from EPA Region I to Bixby, J. (October 8, 1982).
22. Notice Letter from EPA Region I to Blue Ribbon Sports (August 24, 1982).
23. Notice Letter from EPA Region I to Borden Chemical (October 8, 1982).
24. Notice Letter from EPA Region I to Brian Construction (October 8, 1982).
25. Notice Letter from EPA Region I to Brown, D. (November 9, 1982).
26. Notice Letter from EPA Region I to Brown (Young) (November 9, 1982).

27. Notice Letter from EPA Region I to Brunswick Naval Air Station (November 9, 1982).
28. Notice Letter from EPA Region I to C.L. Hauthaway & Sons Corporation (January 19, 1985).
29. Notice Letter from EPA Region I to Cado Fabrication Inc. (September 2, 1982).
30. Notice Letter from EPA Region I to Cannons Engineering (August 24, 1982).
31. Notice Letter from EPA Region I to Central Screw (August 24, 1982).
32. Notice Letter from EPA Region I to Bonan Footwear (October 8, 1982).
33. Notice Letter from EPA Region I to Chelsea School Systems (October 8, 1982).
34. Notice Letter from EPA Region I to Chem Lab (August 24, 1982).
35. Notice Letter from EPA Region I to Chemclean (November 9, 1982).
36. Notice Letter from EPA Region I to Chemical Pollution Control (November 9, 1982).
37. Notice Letter from EPA Region I to Clarostat Manufacturing Co., Inc. (August 24, 1982).
38. Notice Letter from EPA Region I to Clemson Automotive Fabrics (October 8, 1982).
39. Notice Letter from EPA Region I to Chapman Manufacturing Company (January 16, 1985).
40. Notice Letter from EPA Region I to Coastal Metal Finishing, Inc. (August 24, 1982).
41. Notice Letter from EPA Region I to Concord Litho Company (November 9, 1982).
42. Notice Letter from EPA Region I to Courier Citizen Company (August 24, 1982).
43. Notice Letter from EPA Region I to Data General (August 24, 1982).
44. Notice Letter from EPA Region I to Davidson Rubber Division (August 24, 1982).
45. Notice Letter from EPA Region I to D.F. Harris Company (November 9, 1982).
46. Notice Letter from EPA Region I to Disogrin Industries Corporation (August 24, 1982).
47. Notice Letter from EPA Region I to Donnelly Manufacturing Company (August 24, 1982).
48. Notice Letter from EPA Region I to Dynamics Research Corp. (October 8, 1982).
49. Notice Letter from EPA Region I to E.P.E. Corp. (October 8, 1982).
50. Notice Letter from EPA Region I to Electronic Products (October 8, 1982).
51. Notice Letter from EPA Region I to Elektrisola Inc. (November 9, 1982).
52. Notice Letter from EPA Region I to Environmental Waste Removal, Inc. (August 24, 1982).
53. Notice Letter from EPA Region I to Essex International (August 24, 1982).
54. Notice Letter from EPA Region I to Ethan Allen, Inc. (October 8, 1982).
55. Notice Letter from EPA Region I to Town of Exeter, NH (November 9, 1982).
56. Notice Letter from EPA Region I to Fowler, S. (March 5, 1982).
57. Notice Letter from EPA Region I to Franklin Pumping Service, Inc. (August 24, 1982).
58. Notice Letter from EPA Region I to G.T.E. Sylvania (September 2, 1982).
59. Notice Letter from EPA Region I to Gar Doc, Inc. (August 24, 1982).
60. Notice Letter from EPA Region I to General Electric (October 8, 1982).
61. Notice Letter from EPA Region I to General Tire and Rubber Company (August 24, 1982).
62. Notice Letter from EPA Region I to Geonautics, Inc. (October 8, 1982).
63. Notice Letter from EPA Region I to George B. Bent Company (November 9, 1982).
64. Notice Letter from EPA Region I to Glines & Rhodes, Inc. (January 16, 1985).
65. Notice Letter from EPA Region I to Globe Union, Inc. (August 24, 1982).

66. Notice Letter from EPA Region I to Great Bay Disposal Services (August 24, 1982).
67. Notice Letter from EPA Region I to Great Falls Products Co. (October 8, 1982).
68. Notice Letter from EPA Region I to Guilford Industries, Inc. (October 8, 1982).
69. Notice Letter from EPA Region I to Hadco Printed Circuits (October 8, 1982).
70. Notice Letter from EPA Region I to Halcon Research and Development Corporation (January 16, 1985).
71. Notice Letter from EPA Region I to The Hale Company (August 24, 1982).
72. Notice Letter from EPA Region I to Halliburton Services (October 8, 1982).
73. Notice Letter from EPA Region I to Hart Engineering Company (October 8, 1982).
74. Notice Letter from EPA Region I to Haveg Industries (October 8, 1982).
75. Notice Letter from EPA Region I to Hendrix Electronics (October 8, 1982).
76. Notice Letter from EPA Region I to Herbertsons, Inc. (October 8, 1982).
77. Notice Letter from EPA Region I to Hero Coatings, Inc. (October 8, 1982).
78. Notice Letter from EPA Region I to Hitchner Manufacturing Co. (August 24, 1982).
79. Notice Letter from EPA Region I to Industrial Reproductions, Inc. (November 9, 1982).
80. Notice Letter from EPA Region I to ITT Semiconductors (September 2, 1982).
81. Notice Letter from EPA Region I to Jarvis Cutting Tools (September 2, 1982).
82. Notice Letter from EPA Region I to Jewell Electrical Instruments (September 2, 1982).
83. Notice Letter from EPA Region I to The John Iafolla Company (October 8, 1982).
84. Notice Letter from EPA Region I to Keefe, P. (March 5, 1982).
85. Notice Letter from EPA Region I to Keefe, Mrs. P. (March 5, 1982).
86. Notice Letter from EPA Region I to Keefe Environmental Services, Inc. (March 9, 1982).
87. Notice Letter from EPA Region I to Keefe Environmental Services, Inc. (March 9, 1982).
88. Notice Letter from EPA Region I to Kingston Steel Drum (August 24, 1982).
89. Notice Letter from EPA Region I to Kingston-Warren Corporation (August 24, 1982).
90. Notice Letter from EPA Region I to Labelcraft, Inc. (October 8, 1982).
91. Notice Letter from EPA Region I to LePage's Inc. (August 24, 1982).
92. Notice Letter from EPA Region I to LePage's Inc. (August 24, 1982).
93. Notice Letter from EPA Region I to Lewcott Chemicals and Plastics (August 24, 1982).
94. Notice Letter from EPA Region I to Lewis Chemical Corporation (August 24, 1982).
95. Notice Letter from EPA Region I to Liege Company (October 8, 1982).
96. Notice Letter from EPA Region I to Liquid Waste Specialists, Inc. (January 16, 1985).
97. Notice Letter from EPA Region I to Liqwacon Corporation (August 24, 1982).
98. Notice Letter from EPA Region I to McCord Division (October 8, 1982).
99. Notice Letter from EPA Region I to MacDonald & Watson Waste Oil Co., Inc. (August 24, 1982).
100. Notice Letter from EPA Region I to Maine Coastal Services (August 24, 1982).
101. Notice Letter from EPA Region I to Merrimack Coatings (November 9, 1982).
102. Notice Letter from EPA Region I to Microfab, Inc. (August 24, 1982).
103. Notice Letter from EPA Region I to Miller Shoe Co. (October 8, 1982).
104. Notice Letter from EPA Region I to MMT United Organics (October 8, 1982).
105. Notice Letter from EPA Region I to Modern Tool & Die Co., Inc. (October 8, 1982).
106. Notice Letter from EPA Region I to Modutec, Inc. (October 8, 1982).

107. Notice Letter from EPA Region I to Moore Business Forms (October 8, 1982).
108. Notice Letter from EPA Region I to Nashua Brass (October 8, 1982).
109. Notice Letter from EPA Region I to Nashua Corporation (August 24, 1982).
110. Notice Letter from EPA Region I to Nashua Corporation (August 24, 1982).
111. Notice Letter from EPA Region I to Nashua Corporation (August 24, 1982).
112. Notice Letter from EPA Region I to Northeast Electronics (August 24, 1982).
113. Notice Letter from EPA Region I to Northeast Solvents (October 8, 1982).
114. Notice Letter from EPA Region I to Omni Spectra (August 24, 1982).
115. Notice Letter from EPA Region I to Onyx Chemical Company (January 16, 1985).
116. Notice Letter from EPA Region I to Oxford Chemical Inc. (November 9, 1982).
117. Notice Letter from EPA Region I to Page Belting Company (August 24, 1982).
118. Notice Letter from EPA Region I to Palmer Chenard Industries, Inc. (November 9, 1982).
119. Notice Letter from EPA Region I to Pease Air Force Base (October 8, 1982).
120. Notice Letter from EPA Region I to PTI (August 24, 1982).
121. Notice Letter from EPA Region I to Pine Tree Castings (November 9, 1982).
122. Notice Letter from EPA Region I to Polyclad Laminates (August 24, 1982).
123. Notice Letter from EPA Region I to Port Poly Company (October 8, 1982).
124. Notice Letter from EPA Region I to Portsmouth Naval Shipyard (October 8, 1982).
125. Notice Letter from EPA Region I to Prevue Products (August 24, 1982).
126. Notice Letter from EPA Region I to Process Engineering, Inc. (August 24, 1982).
127. Notice Letter from EPA Region I to R&R Education (November 9, 1982).
128. Notice Letter from EPA Region I to Rapid Processing Co., Inc. (October 8, 1982).
129. Notice Letter from EPA Region I to Raybestos (August 24, 1982).
130. Notice Letter from EPA Region I to RCL Electronics Company (August 24, 1982).
131. Notice Letter from EPA Region I to Resolve (November 9, 1982).
132. Notice Letter from EPA Region I to Roymal Coatings (October 8, 1982).
133. Notice Letter from EPA Region I to Rumford National Graphics, Inc. (August 24, 1982).
134. Notice Letter from EPA Region I to S. & W. Waste (August 24, 1982).
135. Notice Letter from EPA Region I to St. Regis Paper Co. (August 24, 1982).
136. Notice Letter from EPA Region I to Sanders Associates, Inc. (August 24, 1982).
137. Notice Letter from EPA Region I to Scott & Williams (September 2, 1982).
138. Notice Letter from EPA Region I to Scott & Williams (September 2, 1982).
139. Notice Letter from EPA Region I to Security Heel Corporation (October 8, 1982).
140. Notice Letter from EPA Region I to Seth Thomas (October 8, 1982).
141. Notice Letter from EPA Region I to Shawsheen Rubber Co., Inc. (October 8, 1982).
142. Notice Letter from EPA Region I to Simmonds Precision Products (October 8, 1982).
143. Notice Letter from EPA Region I to Sofarelli Associates (August 24, 1982).
144. Notice Letter from EPA Region I to S.R.S. (August 24, 1982).
145. Notice Letter from EPA Region I to Spaulding Fiber Co., Inc. (August 24, 1982).
146. Notice Letter from EPA Region I to Sprague Electric Company (October 8, 1982).
147. Notice Letter from EPA Region I to Spray Maine, Inc. (August 24, 1982).
148. Notice Letter from EPA Region I to Strem Chemicals, Inc. (September 2, 1982).

149. Notice Letter from EPA Region I to Sturm Ruger Company Inc. (October 8, 1982).
150. Notice Letter from EPA Region I to Suffolk Services (August 24, 1982).
151. Notice Letter from EPA Region I to Tamposi, S. (October 8, 1982).
152. Notice Letter from EPA Region I to Tansitor Electronics, Inc. (October 8, 1982).
153. Notice Letter from EPA Region I to Teradyne Components (August 24, 1982).
154. Notice Letter from EPA Region I to Tiara Footwear (August 24, 1982).
155. Notice Letter from EPA Region I to TME Corporation (October 8, 1982).
156. Notice Letter from EPA Region I to TYCO Laboratories (November 9, 1982).
157. Notice Letter from EPA Region I to Union Camp Plastics Corp. (August 24, 1982).
158. Notice Letter from EPA Region I to U.S. Samica Corporation (August 24, 1982).
159. Notice Letter from EPA Region I to Unitrode Corporation (August 24, 1982).
160. Notice Letter from EPA Region I to Varian Associates, Inc. (August 24, 1982).
161. Notice Letter from EPA Region I to Velcro USA, Inc. (August 24, 1982).
162. Notice Letter from EPA Region I to Vermont Agency of Transportation (October 8, 1982).
163. Notice Letter from EPA Region I to Vermont Research Corporation (November 9, 1982).
164. Notice Letter from EPA Region I to W.R. Grace (October 8, 1982).
165. Notice Letter from EPA Region I to Western Electric Company, Inc. (August 24, 1982).
166. Notice Letter from EPA Region I to Western Electric Company, Inc. (August 24, 1982).
167. Notice Letter from EPA Region I to Western Electric Company, Inc. (August 24, 1982).
168. Notice Letter from EPA Region I to Weyerhauser Company (August 24, 1982).
169. Notice Letter from EPA Region I to Wrentham Steel Products (January 16, 1985).
170. Letter from EPA Region I to Unitrode Corporation (December 31, 1987).
171. Letter from EPA Region I to Varian Associates (December 31, 1987).
172. Letter from EPA Region I to Jarvis Cutting Tools (December 31, 1987).
173. Letter from EPA Region I to DiversiTech General, Inc. (December 31, 1987).
174. Letter from EPA Region I to Process Engineering (December 31, 1987).
175. Letter from EPA Region I to Sturm Ruger Company Inc. (December 31, 1987).
176. Letter from EPA Region I to Essex Group, Inc. (December 31, 1987).
177. Letter from EPA Region I to Abbott Machine Co., Inc. (December 31, 1987).
178. Letter from EPA Region I to Bacon Industries, Inc. (December 31, 1987).
179. Letter from EPA Region I to Browning-Ferris Industries (December 31, 1987).
180. Letter from EPA Region I to Hart Engineering Company (December 31, 1987).
181. Letter from EPA Region I to Simmonds Precision Products (December 31, 1987).
182. Letter from EPA Region I to Port Poly Company (December 31, 1987).
183. Letter from EPA Region I to Bixby International Group (December 31, 1987).
184. Letter from EPA Region I to Northeast Solvents Reclamation Corp. (December 31, 1987).
185. Letter from EPA Region I to E.P.E. Corp. (December 31, 1987).
186. Letter from EPA Region I to Amstar Corporation (December 31, 1987).
187. Letter from EPA Region I to Teradyne Connection Systems, Inc. (December 31, 1987).
188. Letter from EPA Region I to Town of Exeter, NH (December 31, 1987).
189. Letter from EPA Region I to Hadco Printed Circuits (December 31, 1987).
190. Letter from EPA Region I to Strem Chemicals, Inc. (December 31, 1987).
191. Letter from EPA Region I to Hale Company (December 31, 1987).
192. Letter from EPA Region I to ITT Semiconductors (December 31, 1987).

193. Letter from EPA Region I to United Federal Savings and Loan Association (December 31, 1987).
194. Letter from EPA Region I to Northern Telecom (December 31, 1987).
195. Letter from EPA Region I to American Hoist Crosby Group (December 31, 1987).
196. Letter from EPA Region I to Raymark Industries (December 31, 1987).
197. Letter from EPA Region I to Coastal Metal Finishing, Inc. (December 31, 1987).
198. Letter from EPA Region I to Cado Fabrications Inc. (December 31, 1987).
199. Letter from EPA Region I to Larsen, R., Esq. (December 31, 1987).
200. Letter from EPA Region I to Glines & Rhodes, Inc. (December 31, 1987).
201. Letter from EPA Region I to Beebe Rubber Company (December 31, 1987).
202. Letter from EPA Region I to ISOREG Corp. (December 31, 1987).
203. Letter from EPA Region I to Rath, T., Esq. (December 31, 1987).
204. Letter from EPA Region I to Lewcott Chemicals and Plastics (December 31, 1987).
205. Letter from EPA Region I to Berman, K., Esq. (December 31, 1987).
206. Letter from EPA Region I to Clemson Automotive Fabrics (December 31, 1987).
207. Letter from EPA Region I to Univex Corporation (December 31, 1987).
208. Letter from EPA Region I to Oxford Chemical Inc. (December 31, 1987).
209. Letter from EPA Region I to Chemical Pollution Control (December 31, 1987).
210. Letter from EPA Region I to Wrentham Steel Products, Inc. (December 31, 1987).
211. Letter from EPA Region I to Kewanee Industries, Inc. (December 31, 1987).
212. Letter from EPA Region I to CMC Liquidating Company, Inc. (December 31, 1987).
213. Letter from EPA Region I to S. & W. Waste (December 31, 1987).
214. Letter from EPA Region I to C.L. Hauthaway & Sons Corporation (December 31, 1987).
215. Letter from EPA Region I to Hart Engineering Company (December 31, 1987).
216. Letter from EPA Region I to Aluminum Processing Corporation (December 31, 1987).
217. Letter from EPA Region I to Graf, J., Esq. (December 31, 1987).
218. Letter from EPA Region I to Nelson, R., Esq. (December 31, 1987).
219. Letter from EPA Region I to Dunn, C., Esq. (December 31, 1987).
220. Letter from EPA Region I to Vermont Agency of Transportation (December 31, 1987).
221. Letter from EPA Region I to Johnson Controls, Inc. (December 31, 1987).
222. Letter from EPA Region I to U.S. Samica (December 31, 1987).
223. Letter from EPA Region I to New Hampshire Ball Bearings, Inc. (December 31, 1987).
224. Letter from EPA Region I to Electronic Products, Inc. (December 31, 1987).
225. Letter from EPA Region I to General Electric (December 31, 1987).
226. Letter from EPA Region I to Vermont Research Corporation (December 31, 1987).
227. Letter from EPA Region I to Ex-Cell-O (December 31, 1987).
228. Letter from EPA Region I to Nashua Corporation (December 31, 1987).
229. Letter from EPA Region I to Courier Corporation (December 31, 1987).
230. Letter from EPA Region I to AT&T Technologies, Inc. (December 31, 1987).
231. Letter from EPA Region I to Microdot Inc. (December 31, 1987).
232. Letter from EPA Region I to Melville Corporation (December 31, 1987).
233. Letter from EPA Region I to Bath Iron Works Corporation (December 31, 1987).
234. Letter from EPA Region I to Chelsea School Systems (December 31, 1987).
235. Letter from EPA Region I to U.S. Air Force (January 5, 1988).
236. Letter from EPA Region I to U.S. Navy (January 5, 1988).

13.0 Community Relations

13.1 Correspondence

1. Letter from New Hampshire Water Supply and Pollution Control Commission to EPA Region I (February 7, 1984).
2. Letter from EPA Region I to New Hampshire Water Supply and Pollution Control Commission (February 8, 1984).

13.3 News Clippings/Press Releases

1. 92 News Clippings from the Following Newspapers:
    - Atlantic News & Advertiser - Hampton, NH
    - Boston Sunday Globe - Boston, MA
    - Brattleboro Reformer - Brattleboro, VT
    - Burlington Free Press - Burlington, VT
    - Caledonian Record - St. Johnsbury, VT
    - Carroll County Independent - Center Ossippee, NH
    - Concord Monitor - Concord, NH
    - Daily News - Newburyport, NH
    - The Evening Bulletin - Providence, RI
    - Exeter Newsletter - Exeter, NH
    - Foster's Daily Democrat - Dover, NH
    - Haverhill Gazette - Haverhill, MA
    - Journal Bulletin - Providence, RI
    - Keene Sentinel - Keene, NH
    - Nashua Telegraph - Nashua, NH
    - New Britain Herald - New Britain, CT
    - New Hampshire Sunday News - Manchester, NH
    - New Hampshire Times - Concord, NH
    - Newport Daily Express - Newport, VT
    - Portland Press Herald - Portland, ME
    - Portsmouth Herald - Portsmouth, NH
    - The Providence Sunday Journal - Providence, RI
    - Raymond Times - Exeter, NH
    - Transcript - Dover, NH
    - The Union Leader - Manchester, NH
2. Press Release Issued by EPA Region I (February 14, 1984 - 2 Copies).
3. Press Release Issued by EPA Region I (July 15, 1985).
4. Press Release Issued by EPA Region I (October 28, 1985).
5. Press Release Issued by State of New Hampshire, Department of Environmental Services (December 28, 1987).
6. Press Release Issued by EPA Region I (Date Not Available).

13.4 Public Meetings

1. Set of Meeting Notes, Public Meeting (August 11, 1983).
2. Attendance List, Public Meeting (August 11, 1983).
3. Meeting Agenda, Public Meeting (August 28, 1985).
4. Attendance List, Public Meeting (August 28, 1985).
5. Meeting Agenda, Town Meeting (June 10, 1982).

13.5 Fact Sheets

1. 3 New Hampshire Water Supply and Pollution Control Commission Fact Sheets (April 22, 1982; January 16, 1984 - 2 Copies).

14.0 Congressional Inquiries/Hearings

14.1 Correspondence

1. Letter from a Member of the U.S. Senate to EPA Headquarters (February 26, 1981).
2. Letter from the State of New Hampshire, Office of the Governor to EPA Region I (March 5, 1981).
3. Letter from a Member of the U.S. Senate to EPA Region I (November 9, 1981).
4. 2 Letters from EPA Region I to a Member of the U.S. Senate (December 29, 1981; September 29, 1982).
5. Letter from a Member of the U.S. House of Representatives to EPA Region I (May 6, 1985).
6. Letter from EPA Region I to a Member of the U.S. House of Representatives (September 6, 1985).

15.0 Freedom of Information Act (FOIA) Management

15.1 Correspondence

1. Letter from New Hampshire Water Supply and Pollution Control Commission to International Paper Box Machine Company (October 27, 1986).

15.2 Requests

1. Letter from Curtis Mallet-Prevost, Colt & Mosle to EPA Region I (September 14, 1982).
2. Letter from The General Tire & Rubber Company to EPA Region I (October 5, 1982).
3. Letter from Testa, Hurwitz & Thibeault to EPA Region I (January 17, 1983).
4. Letter from Devine, Millimet, Stahl & Branch to EPA Region I (January 28, 1983).
5. Letter from Moran, J., Esq. to EPA Region I (February 3, 1983 - 3 Copies).
6. Letter from Pretzel & Stouffer to EPA Region I (September 29, 1986).

15.3 Responses

1. Letter from EPA Region I to Curtis, Mallet-Prevost, Colt & Mosle (October 8, 1982).
2. 2 Letters from EPA Region I to Moran, J., Esq. (February 25, 1983; March 1, 1983).
3. 2 Letters from EPA Region I to Devine, Millimet, Stahl & Branch (March 14, 1983; March 22, 1983).
4. Letter from EPA Region I to General Electric Company (October 18, 1983).
5. Letter from EPA Region I to Davis, Polk and Wardwell (December 17, 1985).
6. Letter from EPA Region I to Warren, Goldberg, Berman & Lubitz (December 17, 1985).
7. Letter from EPA Region I to Montgomery, McCracken, Walker & Rhoads (December 17, 1985).
8. Letter from EPA Region I to McCoy & Associates (January 27, 1986).
9. Letter from EPA Region I to Hotchkiss, Robert A. (March 19, 1986).
10. Letter from EPA Region I to American Petroleum Institute (April 21, 1986).

11. Letter from EPA Region I to Gaston Snow & Ely Bartlett (July 24, 1986).
12. Letter from EPA Region I to Pretzel & Stouffer (October 8, 1986).
13. Letter from EPA Region I to International Technology Corporation (December 8, 1986).
14. Letter from EPA Region I to Aetna Insurance Company (August 18, 1987).

16.0 Natural Resource Trustee

16.1 Correspondence

1. Letter from EPA Region I to U.S. Department of the Interior (December 17, 1982).
2. 2 Letters from U.S. Department of the Interior to EPA Region I (January 18, 1983; July 21, 1987).

16.4 Trustee Notification Form and Selection Guide

1. Letter from EPA Region I to U.S. Department of the Interior (April 16, 1987).
2. "Trustee Notification Form and Selection Guide," EPA Region I (April 16, 1987).

17.0 Site Management Records

17.1 Correspondence

1. Letter from Town of Epping, NH to EPA Region I (March 15, 1982).

17.4 Site Photographs/Maps

1. 10 Photographs of the Keefe Environmental Services Site (Dates Not Available).

17.7 Reference Documents

1. "Compatibility Field Testing Procedures for Unidentified Hazardous Wastes," EPA Environmental Response Team (Date Not Available).

Section II

Guidance Documents

GUIDANCE DOCUMENTS

General EPA Guidance Documents

1. Memorandum from Gene Lucero to EPA (August 28, 1985) (discussing community relations at Superfund Enforcement sites).

2. Memorandum from J. Winston Porter to Addressees ("Regional Administrators, Regions I-X; Regional Counsel, Regions I-X; Director, Waste Management Division, Regions I, IV, V, VII, and VIII; Director, Emergency and Remedial Response Division, Region II; Director, Hazardous Waste Management Division, Regions III and VI; director, Toxics and Waste Management Division, Region IX; Director, Hazardous Waste Division, Region X; Environmental Services Division Directors, Region I, VI, and VII") (July 9, 1987) (discussing interim guidance on compliance with applicable or relevant and appropriate requirements).

3. Guidance on Remedial Investigations Under CERCLA, June 1985.

4. Guidance on Feasibility Studies Under CERCLA, June 1985.

5. Community Relations in Superfund: A Handbook (interim version), September 1983.

6. Interim Guidance on Superfund Selection of Remedy, December 24, 1986, OSWER Directive Number 9355.0-19, J. Winston Porter AA/OSWER.

7. Additional Interim Guidance for Fiscal Year 1987 Record of Decisions, July 24, 1987, J. Winston Porter AA/OSWER.

8. Draft Guidance on Remedial Actions for Contaminated Groundwater at Superfund Sites, October 1986, OSWER Directive Number 9283.1-2.

9. Groundwater Protection Strategy, August 1984, Office of Groundwater Protection, EPA Washington D.C.

10. Superfund Public Health Evaluation Manual, October 1986, OSWER Directive Number 9285.4-1.

11. Letter from Lee M. Thomas to James J. Florio, Chairman, Subcommittee on Consumer Protection and Competitiveness, Committee on Energy and Commerce, House of Representatives (May 21, 1987) (discussing EPA's implementation of the Superfund Amendments and Reauthorization Act of 1986).

12. Comprehensive Environmental Response, Compensation, and Liability Act of 1980, amended October 17, 1986.

13. National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300, (1985).

14. Superfund Federal-Lead Remedial Project Management Handbook, December 1986, EPA/540/G-87/001.

APPENDIX C

STATE CONCURRENCE LETTER

State of New Hampshire
DEPARTMENT OF ENVIRONMENTAL SERVICES
WATER SUPPLY & POLLUTION CONTROL DIVISION
6 Hazen Drive, P.O. Box 95, Concord, NH 03301
603-271-3504

ALDEN H. HOWARD
COMMISSIONER

RUSSELL A. NYLANDER, P.E.
CHIEF ENGINEER

COUNCIL
JOHN F. BRIDGES, Chairman
MICHAEL G. LITTLE, Vice Chairman
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JAMES VAROTSIS
WILLIAM T. WALLACE, M.D., M.P.H.

March 18, 1988

Mr. Merrill Hohman
Waste Management Division
U.S. Environmental Protection Agency
J.F.K. Federal Building
Boston, MA 02203

Re: Record of Decision
Keefe Environmental Services Site
Epping, NH

Dear Mr. Hohman:

This office has reviewed the above referenced Record of Decision (ROD) and concurs with the USEPA that the recommended alternative is consistent with the rules and regulations of applicable or relevant and appropriate state standards. Furthermore, if the project utilizes the trust fund, the state will provide a 10 percent match and operational support for the project if state funds are available.

Very truly yours,

J. A. Minichiello

John A. Minichiello, Acting Director
Department of Environmental Services,
Waste Management Division

A H Howard

Alden H. Howard, Commissioner
Department of Environmenatl Services

JAM/AHH/CWB/jw/1738B
cc: Michael A. Sills, Ph.D, P.E.
Robert Cheney, AGO

APPENDIX D

STATE ARARS

I. CONTAINANT AND LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE[1]

	Applicable[2]	Relevant & Appropriate[2]
A. GROUNDWATER:		
1. RSA 149:8,III; N.H. Admin. Ws Ch. 410 - Protection of Groundwater.	X	
a. Ws 410.05(a) Discharges to Groundwater.	X	
b. Ws 410.09 Groundwater Discharge Criteria, incorporating by reference Ws Part 302 (Maximum Contaminant Levels [MCL's] and Suggested No Adverse Response Levels [SNARLS])	X	

[1] See Appendix A for synopsis of each requirement and discussion of action necessary to attain ARAR's.

[2] The absence of any symbol in the columns designated "Applicable" or "Relevant and Appropriate" indicates that, in the circumstances present at this site, the requirement is not applicable or relevant and appropriate.

I. CONTAMINANT AND LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE[1]

	Applicable	Relevant & Appropriate
c. Ws 410.10, Additional Groundwater Criteria.	X	
d. Ws 410.05(e) Groundwater Quality Criteria; Health-based groundwater protection standards.	X	
e. Ws 410.05(g) Groundwater Quality Criteria; Nondegradation of Surface Water.	X	

I. CONTAMINANT AND LOCATION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE[1]

	Applicable	Relevant & Appropriate
B. SURFACE WATER		
1. RSA 149:8,I	X	
2. Ws Ch. 400, Part 437 - Water Quality Standards - Fish Life	X	
3. Ws Ch. 400, Part 439 - Antidegradation Policy.	X	
C. WETLANDS IMPACT		
1. RSA 149:8-a, Dreding and Control of Run-Off; Ws Ch. 400 Part 415, Dredging Rules.	X	
2. Fill and Dredge in Wetlands, RSA Ch. 483-A and Wt. Ch. 300, Criteria and Conditions.	X	

I. CONTAMINANT AND LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE[1]

	Applicable	Relevant & Appropriate
D. AIR EMISSIONS		
1. RSA Ch. 125-C, Air Pollution Control; N.H. Admin. Code Air Ch. 100 Parts 604 and 605.	X	
2. N.H. Admin. Code Air Parts 604 and 605.	X	
3. Fugitive Dust Emission Control N.H. Admin. Code Air Part 1002.	X	
E. HISTORIC PRESERVATION		
1. New Hampshire Historic Preservation Act, RSA 227-C.		
2. Local Historic Districts, RSA 31:89-a-31:89-k.		

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE[1]

Requirement	No Action SC-1	Capping SC-2	Vacuum Extract. SC-3	Aeration SC-4A	Soil Washing SC-4B	Off-Site RCRA Landfill SC-7	No Action MOM-GW1	Removal w/Onsite Treatment MOM-GW3B	Removal w/Off-Site Treatment MOM-GW4
A. HAZARDOUS WASTE REQUIREMENTS									
1. RSA Ch. 147-A, New Hampshire Hazardous Waste Management Act; N.H. Admin. Code He-P Ch. 1905.	X	X	X	X	X	X	X	X	X
a. Hazardous Waste Facility Security requirements, He-P 1905.08(d), incorporating by reference 40 C.F.R. §264.14.	X	X	X	X	X	X	X	X	X
b. General Inspection Requirements, He-P 1905.08(d)(4)(d)	X	X	X	X	X	X	X	X	X

KEY: X - Applicable
Y - Relevant and Appropriate

The absence of any symbol in the column below a designated alternative indicates that the requirement is not applicable, or relevant and appropriate, with regard to the alternative.

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE[1]

Requirement	No Action SC-1	Capping SC-2	Vacuum Extract. SC-3	Aeration SC-4A	Soil Washing SC-4B	Off-Site RCRA Landfill SC-7	No Action MOM-GW1	Removal w/Onsite Treatment MOM-GW3B	Removal w/Off-Site Treatment MOM-GW4
c. Personnel Training, He-P 1905.08(d)(4)(e) incorporating by reference 40 C.F.R. §264.16.	X	X	X	X	X	X	X	X	X
d. Location standards, He-P 1905.08(d)(4)(g) incorporating by reference 40 C.F.R. §264.18 and He-P 1905.08(2)j.	X	X	X	X	X	X	X	X	X
e. Preparedness and Prevention Requirements, He-P 1905.08 (d)(4)(h) incorporating by reference 40 C.F.R. §264, Subpart C.	X	X	X	X	X	X	X	X	X

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE[1]

Requirement	No Action SC-1	Capping SC-2	Vacuum Extract. SC-3	Aeration SC-4A	Soil Washing SC-4B	Off-Site RCRA Landfill SC-7	No Action MOM-GW1	Removal w/Onsite Treatment MOM-GW3B	Removal w/Off-Site Treatment MOM-GW4
f. Contingency Plan, He-P 1905.08(d)(4)(i) incorporating by reference 40 C.F.R. 264, Subpart D.	X	X	X	X	X	X	X	X	X
g. Groundwater Protection, He-P 1905.08 (d)(4)(j), incorporating by reference 40 C.F.R. 264, Subpart F.	X	X	X	X	X	X	X	X	X
h. Closure and Post-Closure, He-P 1905.08(d)(4)(k) incorporating by reference 40 C.F.R. §264, Subpart G.	X	X	X	X	X	X	X	X	X
i. Transfer of facility, He-P 1905.08(d)(5).	X	X	X	X	X	X	X	X	X

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE[1]

Requirement	No Action SC-1	Capping SC-2	Vacuum Extract. SC-3	Aeration SC-4A	Soil Washing SC-4B	Off-Site RCRA Landfill SC-7	No Action MOM-GW 1	Removal w/Onsite Treatment MOM-GW3B	Removal w/Off-Site Treatment MOM-GW4
j. Monitoring, He-P 1905.08(d)(6);	X	X	X	X	X	X	X	X	X
k. Public Notification Plan, He-P 1905.08(d)(9).	Y	Y	Y	Y	Y	Y	Y	Y	Y
l. General environmental standards, He-P 1905.08(d)(1).	X	X	X	X	X	X	X	X	X
m. General design standards, He-P 1905.08(d)(2).	X	X	X	X	X	X	X	X	X
n. Technical Standards for Landfills, He-P 1905.08(f)(1)(f) incorporating by reference 40 C.F.R. §264, Subpart N, and He-P 1905.08(f)(2)(d)	X	X				X	X		

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE[1]

Requirement	No Action SC-1	Capping SC-2	Vacuum Extract. SC-3	Aeration SC-4A	Soil Washing SC-4B	Off-Site RCRA Landfill SC-7	No Action MOM-GW1	Removal w/Onsite Treatment MOM-GW3B	Removal w/Off-Site Treatment MOM-GW4
o. Additional Technical Standards for Treatment He-P 1905.08(f)(2)(a).			X	X	X			X	X
p. He-P 1905.08(f)(2)(c) Storage Standards.			X	X	X	X		X	X
q. Technical Standards for Waste Piles, He-P 1905.08(f)(1)(d) incorporating by reference 40 C.F.R. 264 Subpart L.			X	X	X	X		X	X
r. Technical Standards for Use and Management of Containers, He-P 1905.08(f)(1)(a) incorporating by reference 40 C.F.R. 264, Subpart I.			X	X	X	X		X	X

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE[1]

Requirement	No Action SC-1	Capping SC-2	Vacuum Extract. SC-3	Aeration SC-4A	Soil Washing SC-4B	Off-Site RCRA Landfill SC-7	No Action MOM-GW1	Removal w/Onsite Treatment MOM-GW3B	Removal w/Off-Site Treatment MOM-GW4
s. Technical Standards for Tanks, He-P 1905.08(f)(1)(b) incorporating by reference 40 C.F.R. 264, Subpart J.			X		X			X	X
t. Standards for Generators, He-P 1905.06.			X	X	X	X		X	X
u. Manifesting Requirements He-P 1905.04.			X	X	X	X		X	X
v. Packaging and Labelling Requirements, He-P 1905.05, incorporating by reference N.H. Admin. Code Saf-C-600 and 40 C.F.R. §§ 172, 173, 178, and 179.			X	X	X	X		X	X

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE[1]

Requirement	No Action SC-1	Capping SC-2	Vacuum Extract. SC-3	Aeration SC-4A	Soil Washing SC-4B	Off-Site RCRA Landfill SC-7	No Action MOM-GW1	Removal w/Onsite Treatment MOM-GW3B	Removal w/Off-Site Treatment MOM-GW4
B. SOLID WASTE REQUIREMENTS									
1. RSA Ch. 149-M, New Hampshire Solid Waste Management Act; N.H. Admin. Code He-P Ch. 1901.									
C. ACTION-SPECIFIC AIR EMISSION LIMITS									
1. N.H. Admin. Code Air Parts 604 and 605.		X	X	X	X	X		X	X
2. Fugitive Dust Emission Control, N.H. Admin. Code Air Part 1002.		X	X	X	X	X		X	X

APPENDIX A

I. CONTAMINANT- AND LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
A. GROUNDWATER:		
1. RSA 149:8,III; N.H. Admin. Code Ws Ch. 410 - Protection of Groundwater.	These provisions regulate discharges to groundwater and provide for groundwater protection. No substance designated in Ws Ch. 410, or presenting a potential threat to health or the environment pursuant to Ws 410.05, may be discharged to groundwater so as to exceed water quality criteria at or beyond any compliance boundary, as defined by Ws 410.04(c) and Ws 410.13(a)(3). Corrective action may also be required if groundwater degradation occurs at any point within an intervention zone, as defined under Ws 410.13. *See* Ws 410.14(b)(2).	Site must be remediated to prevent release of contaminants in violation of these provisions. See below for discussion of specific water quality criteria pursuant to Ws Ch. 410.
a. Ws 410.05(a) Discharges to Groundwater	Ws 410.05(a) prohibits discharge of hazardous waste to groundwater	Remedial action to eliminate the uncontrolled discharge of hazardous waste constituents, volatile organic compounds (VOC's), and inorganic contaminants to the groundwater acquifer below the site.

CONTAMINANT- AND LOCATION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

	STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
A.	GROUNDWATER: (Continued)		
b.	Ws 410.09 Groundwater Discharge Criteria, incorporating by reference Ws Part 302 (Maximum Contaminant Levels [MCL's] and Suggested No Adverse Response Levels [SNARLS])	Ws 410.09 establishes groundwater discharge criteria which include the MCLs and SNARLS adopted by the Water Supply and Pollution Control Division and codified at Ws Part 302, Drinking Water Regulations. Standards applicable to contaminants found at at the KES Site include SNARLS for lifetime exposure to toxic contaminants, Ws 302.08(a); SNARLS for contaminants associated with cancer risk, Ws 302.08(b); and MCL's, Ws 302.02, Ws 302.04, and Ws 302.11.	Remedial action to eliminate discharge of contaminants, including VOC's and inorganic contaminants, resulting in groundwater contamination above State MCL and SNARL levels.
c.	Ws 410.10, Additional Groundwater Criteria	Ws 410.10 provides that groundwater shall not be altered so as to render it unsuitable for drinking water. Drinking water standards applicable to the KES site pursuant to Ws 410.10 include both state and federal minimum requirements. _See_, _eg_. federal MCLs for volatile	Remedial action to eliminate discharge of contaminants rendering groundwater unsuitable for drinking water.

CONTAMINANT- AND LOCATION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
A. GROUNDWATER: (Continued)		
	organic contaminants, 52 Fed. Reg. 25,716 (July 8, 1987)(to be codified at 40 C.F.R. §141.61(a)).	
d. Ws 410.05(e) Groundwater Quality Criteria; Health-based groundwater protection standards.	Ws 410.05(e) provides that groundwater shall not contain any substance which the Water Supply and Pollution Control Division (WSPCD) determines may be harmful to human health or the environment. In determining applicable standards under Ws 410.05(e), WSPCD refers to health advisory limits established by the New Hampshire Division of Public Health Services (DPHS).	Remedial action to eliminate discharge of substances which may be harmful to health or the environment, which may include substances exceeding the 10^{-6} cancer risk health advisory limits established by DPHS.
e. Ws 410.05(g) Groundwater Quality Criteria; Nondegradation of Surface Water.	Ws 410.05(g) provides that groundwater quality shall not be degraded such that it results in a violation of surface water standards in any surface water body within or adjacent to the site, and therefore incorporates surface water standards set forth at RSA 149:3 and Ws Ch. 400 Parts	Remedial action to eliminate any discharge to groundwater resulting in a violation of surface water quality at adjacent surface waters, including the Fresh and Piscassic Rivers. Class A standards include dissolved oxygen, coliform and pH limits, see RSA 149:3,I and Ws 432.02; limits on potentially toxic concentrations or

CONTAMINANT- AND LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
A. GROUNDWATER: (Continued)		
	431-439. Contaminants migrate from the KES site to the Piscassic River and it tributary, the Fresh River; pursuant to Laws 1961, 40:1, par. III the Piscassic River and its tributaries are Class A surface waters. Therefore, standards applicable to the KES site include standards for the preservation of Class A waters set forth in RSA 149:3,I and N.H. Admin. Code Ws 432.01 - 432.16.	combinations of substances, Ws 432.03; and limits on the discharge of phenols, Ws 432.14. Discharge of wastes into Class A surface waters is prohibited, and Class A waters are to be maintained as acceptable for bathing and for use as water supplies. RSA 149:3,I.
B. SURFACE WATER		
1. RSA 149:8,I	RSA 149:8 prohibits the disposal of wastes in such a manner as will lower the quality of any surface water below the minimum requirements of the surface water classification. Standards applicable to the KES site include standards for the preservation of Class A waters. See discussion at I,A,1,e above.	Remedial action to eliminate any discharge to surface waters in or adjacent to the site which lowers the quality of any surface water body below the applicable classification requirements. See discussion at I,A,1,e above.

CONTAMINANT- AND LOCATION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
B. SURFACE WATER: (Continued)		
2. Ws Ch. 400, Part 437 - Water Quality Standards - Fish Life	Ws Ch. 400, Part 437 provides that state surface waters shall be free from chemicals or conditions inimical to fish life, *see* Ws 437.02, and shall be preserved as potential cold water fisheries, Ws 437.01.	Remedial action to eliminate discharge of substances, including VOC's and inorganic contaminants, which may cause conditions inimical to aquatic life.
3. Ws Ch. 400, Part 439 - Antidegradation Policy.	Ws Ch. 400, Part 439 establishes the state policy against degradation of existing water quality, and requires protection of in-stream beneficial uses.	Remedial action to ensure that surface water quality is not degraded due to discharge of contaminants from the site.
C. WETLANDS IMPACT		
1. RSA 149:8-a, Dredging and Control of Run-Off; Ws Ch. 400 Part 415, Dredging Rules.	RSA 149:8-a and Ws. Ch. 400 Part 415 establish criteria for conducting any activity in or near state surface waters which significantly alters terrain or may otherwise adversely affect water quality, impede natural runoff or create unnatural runoff. Activities	Wetlands and surface waters are located in and adjacent to the site. Remedial activities on the site must comply with these criteria for the protection of state surface waters.

CONTAMINANT- AND LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
C. WETLANDS IMPACT: (Continued)		
	within the scope of these provisions include excavation, dredging, and grading of topsoil in or near wetland areas.	
2. Fill and Dredge in Wetlands, RSA Ch. 483-A and Wt. Ch. 300, Criteria and Conditions.	RSA 483-A and Ws Ch. 300 regulate filling and other activities in or adjacent to wetlands, and establish criteria for the protection of wetlands from adverse impacts on fish, wildlife, commerce and public recreation.	Wetlands are located in and adjacent the site. Remedial activities on the site must comply with these wetlands protection requirements.
D. AIR EMISSIONS		
1. RSA Ch. 125-C, Air Pollution Control; N.H. Admin. Code Air Ch. 100 Parts 604 and 605.	These provisions establish standards for the release of air emissions, including VOC's and hazardous air pollutants. Applicable standards include the most stringent of the following requirements: (1) New Source Performance Standards, 40 C.F.R. (Part 60);	The potential for the release of fugitive dust and the volatilization of contaminants in soil will require action to prevent unpermitted air emissions from the site.

CONTAMINANT- AND LOCATION-SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
D. AIR EMISSIONS: (Continued)		
	(2) National Emission Standards for Hazardous Air Pollutants (40 C.F.R. Part 161); and (3) New Hampshire State Implementation Plan limits. See RSA 125-C:6; Air 101.09 and Air 606.01.	
E. HISTORIC PRESERVATION		
1. New Hampshire Preservation Act, RSA 227-C	This provision governs the identification and protection of state historic resources and properties.	Site activities which affect any historic property must comply with the provisions of this statute.
2. Local Historic Districts, RSA 31:89-a-31:89-k.	This provision authorizes municipalities to establish historic districts and to regulate construction, alteration, other activities affecting historical properties and districts.	Site activities which affect historic properties or districts should take into consideration local historical preservation provisions.

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

	STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
A.	HAZARDOUS WASTE REQUIREMENTS		
1.	RSA Ch. 147-A, New Hampshire Hazardous Waste Management Act; N.H. Admin. Code He-P Ch. 1905.	These provisions establish standards applicable to the treatment, storage, transport and disposal of hazardous waste and the closure of hazardous waste facilities. See He-P 1905.02(a).	Hazardous waste on site must be managed, stored, transported and disposed of in accordance with the Hazardous Waste Management Act and the rules thereunder. See below for additional discussion of these requirements.
a.	Hazardous Waste Facility Security requirements, He-P 1905.08(d), incorporating by reference 40 C.F.R. §264.14.	This provision incorporates federal RCRA requirements for the adoption of security measures to protect the public from exposure to hazardous wastes.	The facility would be required to be fenced, posted, and operated in compliance with this provision.
b.	General Inspection Requirements, He-P 1905.08(d)(4)(d), incorporating by reference 40 C.F.R. §264.15.	This provision incorporates federal RCRA requirements for the regular inspection of hazardous waste facilities.	The facility would be required to implement regular inspections, maintain written records, and remedy operational problems in accordance with this provision.
c.	Personnel Training, He-P 1905.08(d)(4)(e), incorporating by reference 40 C.F.R. §264.16.	This provision incorporates federal RCRA requirements for the training of hazardous waste facility personnel to ensure compliance with applicable standards and effective emergency response.	The facility would be required to implement a personnel training program and to maintain written records in accordance with this provision.

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

	STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
d.	Location standards, He-P 1905.08(d)(4)(g), incorporating by reference 40 C.F.R. §264.18 and He-P 1905.08 (2)j.	He-P 1905.08(d)(4)(g) restricts the siting of hazardous waste facilities near geological fault areas and flood plains. He-P 1905.08(2)(j) sets forth the State procedure for identifying the boundaries of flood plains.	The location and design of any hazardous waste facility must meet the requirements of He-P 1905.08(d)(4)(g).
e.	Preparedness and Prevention Requirements, He-P 1905.08 (d)(4)(h) incorporating by reference 40 C.F.R. §264, Subpart C.	This provision incorporates federal RCRA requirements for prevention and response to releases of hazardous waste.	Facility construction and operation must include provisions for internal communication, equipment, emergency response capability, and arrangements with local emergency response authorities in accordance with his provision.
f.	Contingency Plan, He-P 1905.08(d)(4)(i), incorporating by reference 40 C.F.R. 264, Subpart D.	This provision incorporates federal RCRA requirements for contingency plans and emergency procedures.	The facility would be required to develop and maintain written contingency plans and emergency procedures in accordance with this provision.

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

	STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
g.	Groundwater Protection, He-P 1905.08 (d)(4)(j), incorporating by reference 40 C.F.R. 264, Subpart F.	This provision, which incorporates federal RCRA standards, supplements N.H. Admin. Code Ws Ch. 410 by establishing additional standards for groundwater monitoring and appropriate remediation at hazardous waste facilities. The provision prohibits the discharge of constituents into groundwater above federal RCRA limits for such contaminants at the compliance point, which is defined as the boundary of each waste management unit under 40 C.F.R. §264.95.	The facility would be required to implement a groundwater monitoring and protection program in accordance with this provision.
h.	Closure and Post-Closure, He-P 1905.08 (d)(4)(k) incorporating by reference 40 C.F.R. §264, Subpart G.	This provision, incorporating federal RCRA requirements, sets forth design and performance standards for hazardous waste facility remediation and closure.	The facility would be required to develop and implement a written plan for site closure and post-closure care in accordance with this provision.

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

	STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
i.	Transfer of facility, He-P 1905.08 (d)(5).	This provision establishes requirements for notifying the Division and future owners or operators when the facility is transferred.	Compliance with this provision would be required prior to any transfer of facility ownership or operation.
j.	Monitoring, He-P 1905.08 (d)(6).	These provisions establish groundwater monitoring requirements and authorize the Division to require other appropriate environmental monitoring.	Operation of the facility would requir groundwater monitoring; additional monitoring, including air emissions testing, may be necessary to detect releases of fugitive dust or VOC's during remedial activities.
k.	Public Notification Plan, He-P 1905.08 (d)(9).	This provision authorizes the Division to require development of a program to inform the public of the status of facility activities. A public notification plan is appropriate to ensure that the public will receive on-going information as to the implementation of the selected remedy and the status of site closure.	A program for regular notification of the public as to the status of site remediation should be developed.
l.	General environmental standards, He-P	This provision requires facilities to comply with specified state and federal	Facility operation must comply with environmental and occupational safety requirements.

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
1905.08(d)(1).	environmental standards and to provide protection to workers in accordance with state and federal occupational health and safety requirements. Applicable occupational standards include 29 C.F.R. Ch. 1910 (industry standards); 29 C.F.R. Ch. 1926 (safety and health standards); N.H. RSA Ch. 277-A (Worker's Right-to-Know Act); N.H. Admin. Rules He-P Ch. 1800, Part 1803 (Toxic Substances in the work place).	
m. General design standards, He-P 1905.08(d)(2).	This provision establishes general facility design standards to prevent release of hazardous constituents.	Plans for the facility would be required to incorporate these design standards to control releases of hazardous constituents.
n. Technical Standards for Landfills, He-P 1905.08(f)(1)(f), incorporating by reference 40 C.F.R. §264, Subpart N, and He-P 1905.08 (f)(2)(d).	He-P 1905.08(d)(1)(f) incorporates federal RCRA requirements for landfills, supplemented by additional state standards set forth in He-P 1905.08(f)(2)(d). He-P 1905.08 (f)(2)(d) requires a demonstration that landfill disposal is the only practical way to dispose of wastes, and a description of how the facility will meet specified design requirements.	Alternatives SC-1, SC-2, and MOM-GW1 may not be able to meet the requirement under He-P 1905.08(f)(2)(d) that disposal by landfill must be deemed to be the only practical way to dispose of hazardous wastes, after assessing all available waste management alternatives. Any land disposal facility in the State of New Hampshire must meet this requirement, as well as the other standards set forth in He-P 1905.08(d)(1)(f).

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

	STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
o.	Additional Technical Standards for Treatment HE-P 1905.08 (f)(2)(a)	He-P 1905.08(f)(2)(a) requires a demonstration that proposed treatment methods will meet specified design and construction requirements.	A treatment facility must demonstrate that the technology will be effective, will include automatic controls to stop inflow in any continuous flow process, will control toxic gases or fumes, and will meet other design requirements of this provision.
p.	He-P 1905.08(f) (2)(c), Storage Standards.	This provision sets forth specified design and construction requrements for facilities which store hazardous wastes.	The storage of hazardous wastes and contaminated soils must minimize any danger to human health or environment, must include mechanisms to prevent and detect releases to the environment, and must otherwise comply with design standards set forth in this provision.
q.	Technical Standards for Waste Piles, He-P 1905.08(f)(1) (d), incorporating by reference 40 C.F.R. 264 Subpart L.	This provision incorporates federal RCRA requirements for waste piles.	Waste piles must be operated in compliance with 40 C.F.R. Subpart L.

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

STATE REQUIREMENT		REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
r.	Technical Standards for Use and Management of Containers, He-P 1905.08(f)(1)(a), incorporating by reference 40 C.F.R. 264, Subpart I.	This provision incorporates federal RCRA requirements for facilities that store containers of hazardous waste.	The design and management of hazardous waste containers must comply with this provision.
s.	Technical Standards for Tanks, He-P 1905.08 (f)(1)(b), Incorporating by Reference 40 C.F.R. 264, Subpart J.	This provision incorporates federal RCRA requirements for facilities using tanks to treat or store hazardous wastes.	The design and maintenance of tanks must comply with this provision, and the facility must implement regular tank inspection and maintenance in compliance with these requirements.
t.	Standards for Generators, He-P 1905.06.	This provision establishes requirements applicable to generators, incuding persons transporting hazardous wastes or treatment residues off-site.	A facility generating wastes for transport offsite must comply with these requirements, including the performance of hazardous waste determinations and the maintenance of records regarding facility activities.
u.	Manifesting Requirements He-P 1905.04.	The transport of any hazardous wastes off-site must comply with the manifesting and record-keeping requirements set forth in this provision.	Shipments of hazardous wastes, including treatment residuals, from the site for further treatment or disposal must be properly manifested and handled in accordance with this provision.

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
v. Packaging and Labelling Requirements, He-P 1905.05, incorporating by reference N.H. Admin. Code Saf-C-600 and 49 C.F.R. §§ 172, 173, 178, and 179.	Hazardous wastes transported off-site must be packaged and labelled in accordance with New Hampshire Department of Safety rules and federal transportation requirements.	The packaging and handling of hazardous waste must comply with this provision, including the requirement that containers of hazardous waste must be clearly marked, and transport vehicles placarded prior to transport off-site.
B. SOLID WASTE REQUIREMENTS		
1. RSA Ch. 149-M, New Hampshire Solid Waste Management Act; N.H. Admin. Code He-P Ch. 1901.	These provisions establish standards applicable to the treatment, storage, and disposal of solid waste and the closure of solid waste facilities.	Non-hazardous solid waste onsite must be managed, stored, treated and disposed of in accordance with the Solid Waste Management Act and the rules thereunder.
C. ACTION-SPECIFIC AIR EMISSION LIMITS		
1. N.H. Admin. Code Air Parts 604 and 605.	These provisions establish limits for the emission of air pollutants. See discussion at Section I,D. above.	A hazardous waste facility must comply with the standards set forth in these provisions, including limits on the release of volatile contaminants into the environment.

II. ACTION-SPECIFIC
APPLICABLE OR RELEVANT AND APPROPRIATE
STATE REQUIREMENTS, KEEFE ENVIRONMENTAL SERVICES SITE, EPPING, NEW HAMPSHIRE

	STATE REQUIREMENT	REQUIREMENT SYNOPSIS	ACTION TO BE TAKEN TO ATTAIN ARAR
2.	Fugitive Dust Emission Control N.H. Admin. Code Air Part 1002.	This provision requires precautions to prevent, abate and control fugitive dust during construction and excavation activities.	Precautions to control fugitive dust emission are required under this provision.